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Part I.

## Original Contributions.

### ON THE INFLUENCE OF THE SEXUAL SYSTEM ON DISEASES OF THE EYE.

*A Lecture delivered at Moorfields, April* 20, 1876.

By Jonathan Hutchinson.

The previous lectures of this course * have been devoted chiefly to the attempt to examine, by the light of fresh clinical facts, certain questions as regards the more rare forms of eye-disease. Some of those which we have discussed have as yet received but little attention from authors, or have perhaps been deemed too obscure and too doubtful for serious debate. We have examined in detail the facts as regards tobacco amblyopia, and the other forms of amaurosis akin to it, and one lecture was devoted to the rare and very curious cases in which women who have never smoked become the subjects of a kind of blindness which is in its early stages just like that so common in smokers. In other lectures we speculated as to

* This was the last lecture but one of a course of fifteen lectures.

the theory of reflex or sympathetic ophthalmititis; as to the possible influence of disease of the liver in producing amaurosis; and we have also inquired as to the evidence which connects affections of the fifth nerve causing neuralgia or toothache, with failures in function, or disturbances in nutrition, of the eyeball. Not a few of our topics have been, as I had to remark at the time, somewhat old-fashioned, such as were subjects of constant debate or of firm belief amongst our forefathers, but which we of the ophthalmoscope era have been inclined to let sleep. Our predecessors were obliged to guess much where we can see clearly, and the natural consequence was, that they were compelled to have frequent recourse to the nervous system to explain facts of which they only saw a small part. We, on the other hand, finding that much which they thought "functional" or "sympathetic" is really due to visible local changes, have been prone hastily to sweep aside what we have regarded as the mere cobweb hypotheses of ignorance. I have had to plead repeatedly that it behoves us to be very careful in this matter, lest we overlook realities. The nervous system, with all its mysteries, remains what it was; and reflex disturbances are just as possible as ever they were. Nor is it alone with reflex disturbances that we have to do, for the labours of patholgists in this special department, Dr. Lockhart Clarke, Dr. Hughlings Jackson, Prof. Charcot, and many others, are every year making it more clear that there exist numerous special forms of degeneration or of faint forms of inflammatory change in the nervous system which spread in definite directions, produce definite groups of symptoms, and which yet are inappreciable at the postmortem, excepting by the aid of the microscope. We have found, too, with greater accuracy than ever before, how disease of one part of the nervous system may produce symptoms which make another suspected. I now have to undertake a branch of the subject which is undoubtedly in many of its aspects sufficiently repulsive, but which it is not the less our duty as medical men to study carefully. I refer to the possible influence of the sexual system, and of various abuses and disorders of the sexual

function, upon the eyes and sight. Of course, I do not refer to the diseases which are called "venereal," but which are only by accident as it were associated with the genital organs; I mean only such maladies as are induced by the re-action of one part of the system upon another quite independently of the introduction from without of any poison or the setting up of local inflammation. Now, there can be no doubt that every organ exercises an influence upon others, and that disorder of one function may often in several different ways induce disturbance of general health, or even special disease of distant parts. If the liver be disordered, the blood will suffer, and the nervous system will suffer, and a complicated train of various secondary diseases will ensue: the same is true of the kidneys, of the spleen, and in degree of all the more important viscera. It is, however, I think, true of the organs which, in either sex, make up what we term the reproductive system, that they exert a deeper and a more mysterious influence than do any other parts of the organism, not only over the physical health but over the moral character of the individual. It is to the possible limits and extent of this influence and in especial reference to the organ of sight that we have now to inquire. In former lectures I have been obliged, incidentally, to mention this subject often, for in inquiring as to the possible causes of amaurosis in various cases, we have had to ask carefully whether or not it was probable that sexual influences might have been at work; we had to ask this question especially in reference to the tobacco cases, in which, since they occur almost solely in young or middle-aged adult men, suspicions of this kind force themselves upon us. Thus, I have already mentioned several of the cases which I purpose to recapitulate and place in better order to-night. The subject is very large and very difficult, and much of what I shall have to say can rank as not much more than conjecture.

It may be convenient, perhaps, to mention first, seriatim, certain suspicions which have been current in the profession as to the possibilities alluded to, and subsequently examine each in order.

I. First, then, I will say that there is a wide-spread suspicion, that in both sexes, but especially in males, sexual irregularities inducing debility, are common causes of the symptom known as *muscæ*.

II. It is believed by many that premature and exhausting use of the sexual function may induce positive amaurosis, with more or less complete blindness. How it is done, and by what changes in the eyeball or brain, there has been as yet but little evidence to show.

III. It is strongly suspected that sometimes in adult men great venereal excess may result in failure of sight, sometimes with and sometimes without other evidences of spinal or cerebral disease.

IV. The association of impotence with blindness from one or other of the more obscure forms of "amaurosis," is so frequent, that it is thought that there must be some link of causal connection between the two.

V. A few scattered cases seem to point to the conclusion that excessive masturbation may induce not only dulness of sight and muscæ, but may cause the vitreous to soften and become opaque, with possibly slow inflammatory changes in other structures.

VI. It is credited to masturbation, that not only does it cause muscæ, but that it may induce curious subjective symptoms, which the patients describe by saying that the eye feels "glassy and stiff," and that sight, although it cannot be proved to be imperfect, is dull.

It will be seen from this enumeration that our subject seems to divide itself naturally into two divisions; first, the disorders which are merely functional and temporary, and due to want of tone; and, secondly, those which are structural and permanent. Respecting the reality and the frequency of the former, there will probably be but little dispute, but the admission of the latter may demand more faith. Every

one is aware that what is known as the tone of the nervous system may be very easily and very certainly lowered by sexual indulgence. "*Omne animale post coitum triste,*" is an observation as old as the first records of natural history, and, that the "sadness" may, by excess, be intensified to almost any extent, there is no difficulty in believing. Is it possible, however, that, further than this, the loss of tone, if greatly prolonged, or frequently recurring, may induce at last structural changes, or may initiate inflammation? It is well that, for practical purposes, we should keep a clear distinction between the two things. By loss of tone, we mean such changes in the molecular constitution of the nerve centres as may be wholly repaired by food, recreation, and rest. If the changes have gone further than this, and if we believe them to be insusceptible of complete recovery, we should then use other words, and speak of structural alteration, degeneration, or inflammation, as the case might be. Whilst, however, separating them clearly for clinical purposes, it is important to admit that severe losses of tone, frequently repeated, may eventually result in degeneration. I may illustrate this by reference to the failure of memory, so constantly and so bitterly complained of by those who suffer from spermatorrhœa. So long as this failure is only temporary and in direct relation with the recent occurrence of its cause, we may attribute it to loss of tone (this defective tone being possibly induced by diminished blood supply); but when it becomes permanent, it is probably indicative of degeneration or atrophy of the molecular matter of the brain corpuscles. Now, it is not improbable that this is pretty much what takes place in the production of muscæ by masturbation. The eyeball has probably on many occasions been reduced to the dull, "glassy," heavy condition indicative of diminished tone, before the minute changes in the vitreous occur which cause the muscæ. The latter are, I should suspect, to be regarded as degenerative rather than inflammatory. You will see that I am for the time taking for granted that muscæ may be caused through the sexual system, and about this I think

there can be but little doubt. The evidence respecting them seems to be much of the same character as it is in the case of acne. It is undoubted that both acne and muscæ may be produced by other than sexual causes, and very often are so. But it is equally undoubted that both are commonly met with under conditions which suggest in the strongest manner that these causes have been at work. Neither of them are common in children or in old people, and for both the ordinary period of first occurrence is that when the sexual function is in early and possibly in premature activity. In many cases the association between the two seems most close. Thus a young man suffering severely from frequent emissions will come complaining of muscæ, and may mention specially and voluntarily that they are always more troublesome when his tone is reduced by the discharges. Confessed onanists, and those suffering from spermatorrhœa, almost always amongst their symptoms mention muscæ, and they are, I think, very disproportionately frequent in the male sex. Muscæ differ from acne as symptoms of sexual derangement in this, that whilst acne spots imply only sexual disturbance, and by no means always indicate debility, muscæ seldom occur until the system has suffered considerably from sexual exhaustion. The facts as regards acne are most important, as illustrating the manner in which it is possible for the reproductive function to cause changes in the nutrition of distant parts. It is necessary, of course, that a person should be predisposed both by the structure of his skin and by the state of his nervous system. Under such circumstances, according to the testimony of many patients, a single act of intercourse or a nocturnal emission may produce acne spots within twenty-four hours. In other cases, styes or small boils may be induced under the same circumstances, and with like definiteness. Unless I had been told this by several persons and by close and accurate observers of their health, I should not have believed it, or ventured to repeat it to you. In women, however, we have facts yet more positive, because more frequently recurring. A lady, apparently in perfect health,

may reveal every menstrual period by the appearance of two or three acne spots on her face, at other times perfectly clear, whilst in those who suffer from acne habitually, the influence of each menstruation, in temporarily increasing it, is usually most marked. Thus these various facts seem to support each other, and to compel us to the belief that the nutrition of the follicles of the face and shoulders, as well as that of the vitreous body of the eye, may be impaired very certainly and very speedily by reduction of tone through the sexual system. The fact that both symptoms may be induced by disorder of the liver and stomach, and frequently occur without there being anything amiss as regards sexual matters, so far from invalidating our conclusions, supports them, since the influence brought to bear under these different conditions is probably to some extent the same in kind.

Examples of another class of subjective symptoms, which I have mentioned as sometimes attending or preceding muscæ, are not very common in Hospital practice. In private, however, it is by no means infrequent to have to listen to complaints that the eyes feel "as if made of glass," that they "feel stiff," that "the eyelids feel stiff," that the eyes "feel as if they were staring and would start out of the head." Sometimes with these complaints there is some slight congestion of the conjunctiva, or a slight chronic ophthalmia tarsi. The expressions referred to almost always, I believe, imply sexual debility, and usually follow either spermatorrhœa or masturbation, or both; they are frequently attended by extreme depression of spirits and great nervousness. A gentleman of near 40, who consulted me many years ago, complained of exactly the group of symptoms I have mentioned. In addition he stated that he could not read for more than a few minutes without causing eye-ache; formerly he had been a great reader. His history was, masturbation in early life, early sexual debility, a long period of continuous and tolerable health, then liability to emissions, for which he was long treated by an eminent and able specialist, with a temporary

cure; next, under special circumstances of excitement, a violent relapse, frequent emissions, followed by an absolute cessation of all sexual desire, extreme nervous depression, and the eye-symptoms mentioned. Shortly afterwards this gentleman committed suicide in a most determined manner. It should be stated that there was a history of insanity in his family, and that no doubt his nervous-system-organisation was peculiar. I have no doubt, however, that his sexual functions had been the exciting cause of all his sufferings, and had indeed proved the curse of his life. He was, as the subjects of many of these cases are, a man of fine feeling, and one who had fought very hard to maintain sexual purity. On the very day before his suicide he called on me for, I believe, no other object than to try to convince me that he had, as he expressed it, "by no means been a beast," but had really done his utmost to overcome his infirmities.*

Whilst, however, I believe that the cases are common in which the influence of sexual irregularities is sufficient to be very decided, to mark the patient's career in life, and to produce, amongst other results, slight derangements both in function and nutrition of the eye and its appendages, I see no reason to doubt that examples of serious ill results are rare. I have seen but very few cases in which the vitreous became softened and filled with opacities in connexion with such causes; yet these are, I suppose, to be regarded only as extreme developments of the changes of which muscæ denote the beginning. One such has impressed itself on my memory, and I have, I believe, seen a few others of the same class, but

* In reflecting over such cases as this, unfortunately, I suspect, not so very infrequent, one cannot help remembering the fearfully graphic lines of a modern panegyrist of lust:—

"Thou shalt blind his bright eyes though he wrestle,
Thou shalt chain his light limbs though he strive;
In his lips all thy serpents shall nestle,
In his hands all thy cruelties thrive.
In the day time thy voice shall go through him,
In his dreams he shall feel thee and ache;
Thou shalt kindle by night and subdue him
Asleep and awake."

less well characterised. A man, of about 36, was brought by his brother from the country, being nearly blind. He was nervous, and in a most desponding condition. The eyeballs were somewhat softened, and in each vitreous were crowds of opacities. He assured me that he had never been in risk of syphilis, and that all his ailments had been brought on by an unconquered habit of self-abuse. I learnt that he afterwards became quite blind, and died in a lunatic asylum.

I find in a foot-note to Mr. Travers' chapter on Diseases of the Retina, the following: "The most pitiable is the amaurosis of early life, from excess of sexual indulgence, and especially from solitary vice. The following are strong examples:—A country lad, of robust constitution, became the alternately favoured paramour of two females, his fellow servants, under the same roof; he was the subject of gutta serena in less than a twelvemonth. Another, at an early period of puberty, suddenly fell into despondency and shunned society, he never left his chamber but when the shade of night concealed him from observation, and then selected an unfrequented path; it was not discovered until too late that, in addition to other signs of nervous exhaustion, a palsy of the retina was the consequence of habitual masturbation." A case, not very dissimilar to the first of the two just quoted, occurred to myself some years ago. A vigorous Scotchman, now the father of a large family, the eldest of which has suffered severely from inherited syphilis, told me that in boyhood he had himself been almost blind; he used, as he said, "to see crowds of blacks before his eyes." His parents brought him up to London for advice, and I am not sure that he did not see Travers. At any rate whilst in town he began to improve, and subsequently he almost wholly recovered. He assured me that the sole cause of his alarming failure of sight was that he had been allowed to sleep in the same room with a servant girl, who used to persuade him, although a mere boy, to try to have connexion with her. The case is of importance as showing that complete recovery may ensue from a very dangerous condition if the cause be removed. Unfortunately

in the more common cases of masturbation such entire removal of the cause is but rarely attained, and the recoveries are usually not so complete. This case, and the two given by Travers, confirm the general belief that it is during the early periods of life that sexual excesses are especially fraught with risk. The breeders of cattle are, I believe, well aware of this, and are usually very careful as to the premature or excessive use of young males.

As regards the precise character of the changes induced in the eye in these cases, we may speculate with much probability, that in the last there were films in the vitreous, but it is not possible to form any opinion in the two given by Travers. I do not know that I have ever seen neuritis of a definite character in undoubted relation with sexual excesses, but I have seen a few which were very suspicious. A gentleman married only a few weeks came to me for advice, in extreme distress—"I am almost blind." He could at six feet only just see letters of 200, yet he was not seriously ill, and excepting some headache, had no other symptoms. There was no history of any unusual excess. I advised abstention, and gave tonics with small doses of mercury, and in a few months he completely recovered. I believe that he has subsequently suffered from other symptoms of nervous exhaustion, which appear to to be fairly referable to the cause which I suspected in the case of his eyes; on the whole, however, he has enjoyed fair health, and has experienced no relapse of his amaurosis. In his case, the discs were slightly hazy, but it was so little, that one good observer doubted whether it was more than a personal peculiarity. Cases such as this remind us of what we proved to be the fact in tobacco amaurosis, that a man may experience rather rapid and very considerable failure of sight, may recover perfectly on disuse of the tobacco, and may, afterwards, without showing any tendency to relapse, resume the habit of smoking in moderation. It is quite possible that the influence of the two kinds of depressants may be to a considerable extent similar. In the case of a boatman who came to this Hospital from Yorkshire, blind, with white discs,

the amaurosis had come on immediately after his marriage, and without any other assignable cause. It seemed probable that he had had a form of neuritis, but he showed no indications of cerebral tumour, and remained in good health.

I have but little to say as to eye disease *in women* resulting from the influence of the sexual system. Sexual irregularities are in the first place much less frequent, in the next, far less potent, in women than in men. In the almost complete immunity of the female sex from some of the forms of amaurosis which I refer to in this lecture, I find another reason for suspecting the influence of the sexual system. Not only are several varieties of amaurosis almost peculiar to males, but other forms of nerve disorder, loco-motor ataxia, for instance, observe the like rule. Now, men differ from women as regards their exposure to causes of nerve disorder in several other matters quite apart from the difference in the sexual system. They smoke, they drink more, they more frequently contract syphilis, and they are in some ways more exposed to mental wear and harass. If, however, in any given case all these possible causes have been eliminated, and in some of the more peculiar forms of eye disease in males, they may all be eliminated, we then fall back on the sexual system.

It is comparatively seldom that young women come to us complaining of muscæ, and when they do, there is usually some definite cause in the condition of the eye. I do not think that at this Hospital, amongst those who complain of muscæ, we have one young woman for five young men. In later life, at almost the climacteric period, cases in women are I think more common.* Nor can I recollect many cases in which, with more severe symptoms of eye disorder in women, I have felt inclined to suspect the sexual functions. It is true that it is far more difficult to inquire about masturbation in girls than in men, but with all allowance for this, I repeat it

* I make these statements without having counted cases, and from general impressions only.

is but rarely that I see any reason to suspect it. In one remarkable case, which I well remember, since the poor patient gave me a great deal of trouble for many years, I felt certain that excessive masturbation was the cause of a state bordering on insanity, and attended by slowly progressive and unsymmetrical amaurosis. The patient was a single woman, aged 40, with an earthy pallor of skin, and nervous to a most miserable degree. One eye became blind, with pallor of the outer side of the disc, and the other failed greatly. I have lost sight of the poor creature, and suspect that she has become an inmate of some asylum.

That there are certain forms of amblyopia and disordered nutrition of the eye, which are in connexion with disturbed or suspended menstruation, is highly probable; in fact, when in the female sex the generative function does affect the sight, it is I think more frequently in connexion with menstruation than with any form of excess or irregularity in sexual indulgence.

We know also, that paraplegia from sexual causes (if we except the "functional" forms met with in hysterical girls) is rare in females, whilst examples of it in men are not uncommon. The cases of paraplegia in men in this connexion are worthy of very careful study in association with the disorders of sight. It is probable that close examination would show us that we must recognise several distinct forms, some chronic and some acute, some easily recovered from, and others permanent. It would be of much interest to know whether any are unsymmetrical.

When satyriasis occurs, as it sometimes does, in connexion with symptoms of spinal disease and with failure of sight, it is sometimes very difficult to determine whether it is the cause or only a symptom. I have seen very marked examples of it in connexion with certain forms of amaurosis attended by white atrophy. It has also been noticed in loco-motor ataxia. It is, I believe, not infrequently a prelude to entire extinction of the sexual function. It may not improbably in most cases be allowed to stand as an indication that the man's sexual system

has for long been unduly prominent, and a source of danger to his health.

There yet remain for mention certain cases in which the sight fails at or about puberty, or perhaps a few years later, without apparent cause, and under circumstances which, whilst nothing can be proven, much may be suspected. These cases are not frequent, and they occur almost solely in males. Sometimes two boys in the same family are attacked. There is no visible neuritis, but the discs become pale, the early symptoms being exceedingly like those of tobacco amaurosis. I have had two or three groups of cases of this kind under observation. In one of them, two brothers, who did not smoke, both became nearly blind, with pale discs, soon after the period of puberty.

I must also draw attention to the very frequent coincidence in adult life, and often in very robust men, of amaurosis, slowly progressive, with atrophy, in conjunction with certain failure of the sexual functions. I have seen enough cases illustrating this combination to make me feel sure that there must be some bond of connection. In these cases the eyes do not, as a rule, fail simultaneously, a fact which would suggest the existence of progressive spinal disease. I attach great importance to this simultaneous or non-simultaneous failure. All the true tobacco cases are symmetrical, whilst in most of those in which I have attributed amaurosis to the sexual system, one eye has taken precedence of the other.

In speaking of tobacco, I must mention a possible source of fallacy, and it is this, that in some cases the sexual symptoms are not in any other relation to those displayed by the eyes than as common results of the same cause. I suspect that tobacco not unfrequently induces forms of sexual debility which are very closely parallel in their clinical history to what we now know to be true of tobacco amaurosis. Sometimes the function is reduced by excessive smoking to the very lowest point, or even extinguished, to recover again when the tobacco is left off or reduced in quantity. This

may happen to most robust men. In others, if the patient is unaware of the cause of his condition, and continues to smoke heavily, the function may be permanently suspended. You may have tobacco amaurosis without anaphrodisia, or anaphrodisia without amaurosis, but sometimes, and not infrequently, the two go together. It is in these latter, I repeat, that mistakes may be made, and the sexual system may be blamed as a cause when it is really only a victim.

Here let me remark that in many, perhaps most, of the cases in which paraplegia results from sexual causes there is no affection of the sight. Absolute impotence may also occur without any degree of paraplegia, and without any degree of amaurosis. There is certainly no essential and unvarying bond of connection between these three symptoms. Rather we must admit that these and other symptoms having reference to the sexual system, may present the most various combinations, now one, now another, and now several together being omitted from the usual group.

Let me say also that, in attempting to estimate the influence of the sexual functions upon the health, we must by no means confine our inquiries to excessive indulgence either in intercourse or masturbation. In many persons, excessive irritability, frequent and continued erythism, without indulgence of any kind, and without emissions, yet tells most seriously on the health, and may, I suspect, produce symptoms very similar to those attending excesses. In such cases, the surgeon must judge for himself, for his patient will often give him very imperfect information.

Thus, then, gentlemen, to conclude, I think we may safely assume that it is probable that the eye does suffer, both in connection with its functions and its structure, from influences brought to bear on it through the sexual system. Whilst in the larger class of cases a functional disturbance—a loss of tone, in which the eye participates with the rest of the organism—is all that results, or, at any rate, at first; yet we must, I think, believe that it is possible for very grave nutritional

changes also to be thus caused. The precise manner in which they are brought about is a question of extreme interest for the physiologist, and, at the same time, one of extreme difficulty.

From a practical point of view, I cannot but think that a knowledge of the facts which we have been discussing is of great importance, not only to our speciality, but to all who undertake the responsible duty of giving advice as to health. Sir James Paget has, as most here probably know, written an eloquent and able lecture on this subject, with the chief aim of counteracting some of the exaggerated impressions which are abroad. It is undoubted that quacks have, for their own purposes, spared no pains to terrify their victims; still, although I much honour Sir James' motive, I must acknowledge that I cannot but suspect that it has led him to estimate too lightly the physical evils which do actually result from sexual irregularities. That bad cases are rare, we must all admit, and it is matter of special congratulation to myself, that in compiling this lecture, and in reviewing for that purpose an experience of many years, during which I have paid constant attention to this subject, I have been able to collect but very few examples of destructive eye-disease from sexual causes. They are, indeed, so exceptional, that a sceptic might almost fairly doubt as to the reality of the supposed bond of connection. I may confess, however, that I cannot myself doubt; I believe that they are perfectly real, that they are examples of the extreme of what is possible, and of what in minor degrees is far from rare.

## HISTORICAL NOTICE CONCERNING THE DOCTRINE OF THE SMALLEST VISUAL ANGLE.

By J. Hirschberg, *of Berlin.**

The acuteness of vision is measured by the smallest visual angle, under which two luminous points or lines can be distinguished apart. The first researches on this subject were those of Robert Hooke in the year 1674. His statements are accepted by Helmholtz,† but are called in doubt and severely criticised by Aubert‡ and Mauthner.§ Where, as in this instance, a philosopher of the first rank is concerned, one who contended with Newton for the palm, we naturally look for assent rather than adverse criticism, and, at all events, feel impelled to seek for light by strict historical inquiry.

Helmholtz (l. c.) says:—"The acuteness of vision has been much studied since telescopes came to be constructed. Hooke started at once from the right principle by inquiring under which angle it was possible for double stars to be distinguished as such." Aubert (l. c.) has the following:—"As regards the statements concerning the distinguishableness of stars, I must demur to that most equivocal, but ever repeated one of Hooke's (Smith-Kaestner, Lehrbegriff der Optik, 1755, pp. 29 and 502), that any one should be able to distinguish stars apart, which are 60″ distant from each other. Those are only exceptional cases, in which the satellites of Jupiter can be distinguished by the naked eye: a shoemaker at Breslau, of the name of Schoen, recognised them whilst the

* Translated by Dr. A. Samelson, of Manchester.

† Physiol. Optik, p. 223 (Karsten's Encyclopädie der Physik, IX. 1867).

‡ Physiol. Optik, p. 579 (Graefe-Saemisch, Augenheilkunde, II. 2; 1876).

§ Optische Fehler des Auges, p. 123, 1876 (first published some years before).

first was two minutes and the third more than four minutes distant from the planet (Humboldt, Kosmos, III, p. 112). The stars $\epsilon$ and $\varsigma$ Lyræ, which are 3′ 27″ apart, can only just be distinguished from each other." And Mauthner writes (l. c.):—"Almost in every place where this subject is discussed, we meet with a leading reference to the primary observation of Hooke's (1705), who states that even the most powerful eye is scarcely able to distinguish two stars under a visual angle of less than half a minute, and that scarcely one in a hundred can do so under an angle of less than one minute. If this be intended to mean that, generally speaking, man's eye possesses the power of distinguishing two stars apart under a visual angle of one minute, there never was a more incorrect, and one might say, more untruthful assertion." Again (p. 126): "The fact is that an eye possessed of normal acuteness, according to Snellen, that is one able to differentiate under an angle of one minute, can under the most favourable conditions only distinguish stars which are at least five minutes apart. It is, therefore, not a little strange to find Helmholtz agreeing with the baseless statements of Hooke, and saying: 'The other observers who did not experiment on stars, but on white illuminated stripes or squares, found the acuteness to be somewhat less.' This admission by Helmholtz of the correctness of Hooke's statements is the more to be regretted, as it is not laws alone and rights but references also, that, like hereditary taints, are transmitted perennially; we thus find, *e. g.*, Boettcher, even in 1870, giving the reasons why we see stars under a *lesser* visual angle than we see terrestrial objects, whereas, as a matter of fact, for stars to be distinguished, the visual angle requires to be five times larger, and an eye, distinguishing terrestrial objects under no smaller angle—it would see Snellen's No. 100 at no greater distance than 20 feet—would be amblyopic in a high degree." And, lastly, p. 127:—" . . . all the cited experiments made previously to the latest by Volkmann (1868), proved that the distinguishing power of the human eye does, indeed, under favourable circumstances, attain to

such a height as Hooke had erroneously assumed it to reach under the unfavourable conditions of star-examination, that is to distinguish still clearly under a visual angle of one minute."

The apparent assurance of this author might easily impose upon the reader as the outcome of an accurate verification of references.

I shall, however, in the first instance, show that Hooke, as early as 1674, by his experiments, which were alike correct and exhaustive, has so completely settled the main question concerning the acuteness of vision, that but little more remained to be done.

In Birch's History of the Royal Society (London, 1757, III. p. 120),* we meet with the following:—"January 15th, 1674. Mr. Hooke made an experiment with a ruler divided into such parts as being placed at a certain distance from the eye, appeared to subtend a minute of degree; and being ernestly and curiosly viewed by all the persons present, it appeared, that not any one present, being placed at the assigned distance, was able to distinguish those parts, which appeared of the bigness of a minute, but that they appeared confused. This experiment he produced, in order to shew that we cannot by the naked eye make any astronomical or other observation to a greater exactness than that of a minute, by reason, that whatever object appears under a less angle, is not distinguishable by the naked eye; and therefore he alledged, that whatever curiosity was used to make the divisions of an instrument more sure, was of no use, unless the eye were assisted by other helps from optik glasses."

But what are we to say of the statement ascribed to Hooke, that two stars may be distinguished apart under an angle of one minute? The origin of this imputation may, from a reference, unfortunately without the passage referred to, in Smith's "Opticks," Cambr., 1738, p. 31, be traced to

* These experiments are not to be found in the Philos. Transactions. Of course not—"*neutiquam acta philosoph-societati regiae tribuenda.*"—Phil. Transact. 1674, p. 141.

"Animadversions on the first part of the machina coelestis of Johannes Hevelius . . . . by Robert Hooke, London, 1674," pp. 7 and 8 (a work referred to in the Philos. Transactions, 1674, p. 275). This work, in the original, not being procurable in Berlin, my friend Dr. J. Friedländer wrote to the Secretary of the Royal Society, to whose courtesy I am indebted for the following authentic transcript:—

"'Tis impossible with sights made after Ticho's or Hevelius his way, to distinguish any distance in the Heavens less then half a minute, or thirty seconds, and hardly one of a hundred can distinguish a minute.

"And this being proved, what will become of all the machinations and contrivances for greater instruments, to show the Divisions of single or double Seconds? May not single minutes, nay half minutes, by the help of Diagonal Divisions, be sufficiently distinguished in an instrument of three-foot radius? What need is there then of all the other cumber? Certainly any one that will but try with the one and the other instrument, will find himself able to do as much with an instrument of three foot, as with one of three score, since the eye cannot distinguish a less angle, at least none that I have yet met with hitherto. Who is there that by his bare eye can distinguish any of the Telescopical spots in the moon, though some of them are above a minute in diameter? As for instance, who can see Mount Sinai, so call'd by Hevelius, which is a bright spot in a dark field, and consequently must appear near two minutes in diameter to the naked eye? or who can see Palus Mareotis or the Lacus Niger, which are two dark spots in light fields, and each more then a minute in Diameter? Now if the eye cannot distinguish a smaller object then appears within the angle of half a minute, 'tis not possible to make any observation more accurate, be the instrument never so large."

Manifestly Hooke's criticism is concerned with observations by the naked eye, to which, as a cautious philosopher, he assigned rather narrow limits. Yet, moreover, he has himself left us an authoritative interpretation of the above passages.

In the controversy between him and Hevelius, in which at that wonderful period of regeneration of exact research the whole of the learned world took the most lively interest, some of the members of the Royal Society took sides with Hevelius, and thus gave to Hooke the opportunity of replying to their strictures. We find his reply at page xviii of his "Posthumous Works, 1705," where he expressly refers to page 7 of his "Animadversions" which had been written several years before:—

"I believ'd it impossible for any one to distinguish with various sights any distance in the heavens to less than half an minute, and very few to a Minute.

"Our Eyes cannot distinguish an Angle less than half a Minute, nor is this a defect in my own Eyes only, for the Experiment may easily be try'd with the best Eyes."

There is here no reference whatever to stars as distinguishable under an angle of one minute, and it is only in a passage in the Posthumous Works that the stars, although quite incidentally, are adverted to, (Lectures on Light, p. 97, January or February, 1681, published 1705):—"What soever object therefore affect the Eye under a less angle than that Eye can distinguish becomes invisible or not seen. Now whereas most Eyes distinguish not a less angle than a Minute, or the 60th part of a Degree, or 21,600th part of a Circle, therefore whatever is sensated or seen by it is seen of that bigness or under that Angle: and so *if there are* 2 *or* 3, *or* 10 *or* 100 *small stars so near together, as that they are all comprised within the Angle of one Minute, the Eye has a Sensation of them all, as if they were one Star, and distinguishes nor one from an other;* so likewise is it, that if the Light be strong and powerful, so as to affect the Eye, it allways appears of the Bigness of a Minute, though possibly its real angle be not a second."

It is evident, therefore, that Hooke did not contend that two stars could be made out singly under an angle of one minute; on the contrary, he maintains that two, or any

aggregate of stars contained in the space of one minute, cannot be distinguished apart.

The first who from the standpoint of physiological optics refers to Hooke is Smith (Opticks, l. c.) :—

"Dr. Hooke assures us that the sharpest eye cannot well distinguish any distance in the heavens, suppose a spot of the moon's body, or the distance of two stars, which subtends a less angle at the eye than half a minute ; and that hardly one of a hundred can distinguish it when it subtends a minute (Animadversions, p. 8). If the angle be not bigger than this, the two stars appear to the naked eye, as if they were but one."

This may still be allowed to pass, as may likewise the following negative wording of the reference by Jurin (Essay upon Distinct and Indistinct Vision, appendix to Smith's Opticks, p. 152) :—"Dr. Hooke asserts that the sharpest eye cannot distinguish the interval between two stars, that are less than half a minute asunder, and that not one eye in a hundred can distinguish an interval of less than a minute."

And it is from this negative that there seems to have been evolved, by a process noways warranted in logic, the positive reversal, whereas the correct account is still to be found in Gehler's Handwörterbuch der Physik, iv, 1436, 1824, Muncke.

By the representations of Aubert and Mauthner, from which we started, we are thus reminded of the saying of Laplace, that any testimony is apt, by progressive tradition, to be stript of its truth, not unlike an object which, though still seen distinctly through one plate of glass, is by a great number of such plates rendered quite invisible.

## BILATERAL DEVIATIONS OF THE EYES.

By Priestley Smith,

*Ophthalmic Surgeon to the Queen's Hospital, Birmingham.*

In Part II of Volume VIII of these Reports, I recorded a case in which both eyes deviated fixedly to one side, while the movements of convergence remained, nevertheless, unaffected.

The case was recorded as "an illustration of the fact that there exist in the brain, centres which preside over the parallel ateral movements of the eyes, which centres are distinct from those which govern the movements of convergence."

The condition of the eyes, as stated in the former paper, appeared to be identical with that described by Dr. Hughlings Jackson, at page 96 of the same volume, as one of the in what he calls the "second degree of hemiplegia," but the hemiplegia was absent.

I am now able to make an important addition to the record of this case, and to place side by side with it some notes of a few other cases belonging to the same category; cases, namely, of ocular deviation due to disease, not of the nerve-trunks, but of the brain-centres which control the movements of the eyes. Only two of these cases occurred in my own practice, the others were observed in the medical wards of the General and the Queen's Hospitals, and I am much indebted to the physicians under whose care they came for calling my attention to them. From a physician's point of view, the notes which I am able to submit are, I fear, defective in many particulars; they contain, however, unless I am mistaken, points of considerable interest.

Case I.—*Parallel Conjugate Movements Lost—Convergent Movements Retained—Unequal Recovery of Movement in the Two Eyes—Onset of Hemiplegia later.*

The first part of this case is recorded at page 185 of

Volume VIII of these Reports; the salient points are here recapitulated, as follows:—

Pain in the head and vomiting.

Deviation of both eyes to the right.

Total loss of conjugate movement to the left.

Perfect performance of movements of convergence.

Frequent winking of right eyelids.

Synchronous but imperfect winking of left eyelids.

Gradual recovery in right eye of movement to the left.

No paralysis discovered in any other part.

The suggestion offered in the last paragraph of the former paper, that the conjugate deviation might be due to tonic spasm rather than to paralysis, appears to me now to have been erroneous. Shortly after recording the case up to this point, I lost sight of the patient and did not again examine him until the present month, October, 1876. The following history of the events which occurred in the interval was obtained from the patient and from his mother; they are both intelligent and took pains to give me the facts correctly.

Soon after Christmas last the patient noticed a little weakness in the left arm and leg; he could not grasp things well with the hand, and the leg dragged a little. During a month this weakness slowly increased until he was unable to walk. He took to bed, and a few days later he was completely paralysed on the left side; "he could not move a finger or a toe," the left arm and leg were "cold and numb." There was severe headache and vomiting for about a week. About a fortnight later the right side became affected also, but in a minor degree. The leg was almost powerless, the arm and hand were weak and clumsy, but did not lose all power. The face was a little drawn, but they cannot remember to which side. There was not at any time loss of consciousness or confusion of speech. A few weeks later the right side began to recover, the arm first and later the leg. Later still the use began to return in the left side; it returned in the arm before the leg, and first of all in the fingers and toes. The patient speaks with confidence as to the order of the recovery as here stated, and his mother corroborates his account.

During this time there was no fresh trouble with the eyes. The patient believes that they have continued steadily to recover their power of movement since they were last examined by me.

The double vision (resulting from the right eye regaining power of movement before the left) had already disappeared before the paralysis laid him up, and has not been noticed since.

*Present state* (*October 18th*, 1876).—The right arm and leg have recovered completely, or very nearly so. The left hand and arm are weak and clumsy; the left leg is very weak and cannot yet be used in walking, the patient can get about a little by supporting himself upon the chairs and table.

There is no discoverable facial paralysis; if any difference exists between the two sides, the left is slightly weaker than the right. The eyes are parallel and properly directed. The right has recovered normal power of movement in all directions. The left, on attempting to turn to the full extent to the left, does so in an unsteady, jerking manner; in all other directions it moves steadily to the normal extent.

CASE II. — *Parallel Conjugate Deviation — Slight Hemiplegia — Unequal Recovery of the Eyes.*

John F., about 45 years of age, was under the care of Dr. Rickards in the General Hospital some months ago. Before his admission he had had severe pain in the head and vomiting for about eight weeks. On admission, both eyes were turned fixedly to the right, and neither had any power of movement towards the left; the left side of the face was paralysed, the left eyelids could not be closed; there was slight paralysis of the left limbs. When I examined the patient's eyes with Dr. Rickards, six weeks later, there was conjugate deviation to the right, both eyes were well turned to that side and they were parallel, but when the patient made an effort to look towards the left it was found that the right eye had recovered power of movement in this direction up to, and a little beyond, the median line, whereas the left eye had almost no power of movement to the left. The right eyelids winked frequently and their movement was accompanied by a very feeble and incomplete winking of the left lids. The left lids were more widely open than the right.

CASE III.—*Parallel Conjugate Deviation—Unequal Recovery of the Eyes.*

David T., a miner, about 50 years of age, was under the care of Dr. Sawyer in the Queen's Hospital in September, 1875.

About twelve months before admission there had been, according to the patient's statement, severe pain in the right side of the head and face, followed by "squinting of both eyes" to the right; the pain lasted about four or five months. There is no definite history of loss of power in the limbs.

At the time when I had the opportunity of examining this patient's eyes with Dr. Sawyer, the right eye had normal range of movement in all directions, while the left eye could not be turned towards the left beyond the median line; in short, the condition resembled that produced by paralysis of the sixth nerve. The patient, however, stated most positively that, at the outset, both eyes had been affected. There had been, he said, pain in the right forehead and temple, and both eyes had squinted to the right, "quite into the corners," and it was only lately that the right eye had recovered the power of turning towards the left.

CASE IV.—*Conjugate Movements Upwards and Outwards Lost—Convergence in Excess—Parallel Conjugate Movements Retained.*

Some notes of this case appeared in the Birmingham Medical Review for October, 1875. I repeat them here more fully, together with an account of a subsequent examination.

John G., a groom, aged 44, suffered in 1874 from great pain in the head, vomiting, double vision, and distressing giddiness. He recovered from this attack, and resumed work. In June, 1875, he was seized with a similar attack, and admitted into the Queen's Hospital, under the care of Dr. Heslop. On admission, there was severe pain in the head, vomiting, double vision, and the most distressing giddiness on attempting to walk, especially on making the effort to look upwards. The giddiness appeared to depend on the affection of the eyes, for with the eyes closed the patient preserved his balance perfectly, even with the feet close together. The condition of the eyes, when submitted to me for examination a week later, was as follows:—

The acuity of vision, refraction, accommodation, and ophthalmoscopic appearances, were normal in each eye. The patient's appearance was singular, by reason of an unnatural position of the eyes. They maintained a constant convergence towards a

point two feet distant from the face, and rather below the horizontal plane. A flame held at this distance was seen single, but at any greater distance it was seen double. The patient was unable to *diminish* to the smallest extent the convergence, so as to direct the eyes to a point more distant than two feet. When the flame was brought nearer to the face, in the horizontal plane, it appeared that there was very slight, if any, power of *increasing* the convergence; in short, *under this test*, it appeared that both external recti, and both internal recti, were paralysed. By lowering the flame while it approached, however, it was found that, in looking downwards, the eyes retained some power of increasing their convergence, but to what extent was not ascertained, as the movement appeared to be performed unsteadily. Vertical movement upwards, above the horizontal plane, was totally lost. The strongest effort to look higher than this, resulted only in slight vertical jerking movements in both eyes, and a little elevation, without jerking, of the upper lids, so as to uncover a little of the sclerotic above the cornea. With regard to parallel conjugate movements, the eyes were tested by moving an object from right to left, and from left to right, at a few feet distance. Both eyes followed the object to the normal extent in either direction, though when turned to the maximum in either direction, there was a little jerking of the eye turned inwards. They preserved, throughout, the degree of convergence before stated. *Under this test*, both external recti, and both internal recti, were active.

During his stay in hospital the pain in the head entirely disappeared; but the condition of the eyes, and the difficulty in walking, remained almost unchanged on his departure.

I have quite recently succeeded in tracing this patient, and am now able to add the following notes. He states that after leaving the hospital he slowly and steadily improved. The double vision disappeared, and he became able to look upwards. The giddiness disappeared at the same time. He could get about again without difficulty. All went on well until three weeks ago, when he caught cold: sore throat followed, then pain in the head and vomiting, and the eyes became as bad as ever again.

His present state is as follows:—The eyes maintain a convergence to a point eight inches from the face, and about three

inches below their own level, the face being vertical. The amount of convergence appears to vary a little, but it is not properly under control; it cannot be voluntarily diminished, but, on looking downwards at an object close to the face, it is somewhat increased. There is neither spasm nor paralysis of the accommodation. The pupils respond to light, and also contract with increase of convergence. The parallel conjugate movements are much less free than at the former examinations.

Tested by the horizontal and vertical movements of an object before the face, each eye is found to have the following range:—

*Outwards*, only a little beyond the median line, and much unsteadiness and jerking attends the effort.

*Inwards*, to the full extent, but with a little jerking.

*Downwards*, apparently to the normal extent.

*Upwards*, no movement is possible above the horizontal line, and much jerking attends the effort.

### Case V.—*Conjugate Movements Upwards and Outwards Impaired—Convergence in Excess.*

Sarah G., a domestic servant, aged 26, unmarried, was admitted into the General Hospital, under the care of Dr. Russell, on November 24th, 1875, in a confused, semi-conscious condition, apparently hysterical. It was noticed that the eyes were strongly convergent. The history given by the patient is, that during the previous ten days she had been much overworked, and had suffered from headache and giddiness, and that while at the washing-tub she had become suddenly giddy, had attempted to speak to a person present, but had found herself unable to do so, and that she then fell to the ground, and remembers nothing more until she came to her senses the next day, just after her admission into the hospital. Two days later, when at Dr. Russell's request I examined the patient's eyes, their condition was as follows:—In distant vision the eyes were sometimes parallel, but on looking intently, one or other, generally the right, deviated inwards. In near vision, the tendency to inward deviation was greater than in distant vision. In attempting to look upwards the inward deviation attained its maximum; in looking downwards, it was at its minimum, and in this position the eyes

were for a short time properly directed; but one always soon deviated inwards, and parallelism was afterwards regained with much difficulty. Double vision accompanied the deviation. The movements of each eye, when tested by vertical and horizontal movements of an object before the patient, were as follows:—

*Outwards*, nearly to the full extent, but when approaching the maximum turning a very unsteady, jerking action occurred: the effort caused aching of the eye, and giddiness.

*Inwards*, to the full extent at least, probably farther, and with extreme contraction of the pupil.

*Downwards*, to the normal extent.

*Upwards*, to not more than half the normal extent at most, and with jerking, aching, and giddiness. The movements upwards and outwards appeared rather more impaired in the left, than in the right, eye.

The right eye had an apparent myopia $\frac{1}{30}$; it could accommodate up to about 15 inches, but not nearer; the left eye had an apparent myopia $\frac{1}{20}$; it could accommodate to about the same distance, or a little nearer. Four days later the eyes were again examined, having in the interval been brought fully under the influence of atropine. The apparent myopia proved to have been due to spasm of the accommodation; it had given way in each eye to hypermetropia $\frac{1}{30}$. All tendency to excess of convergence had disappeared, but the movements outwards and upwards still remained impaired in both eyes, and a little more so in the left than in the right.

The atropine was discontinued, and during the following few weeks the eyes slowly recovered their normal power of movement outwards and upwards; the movement upwards was the last fully to return.

I have recently (November, 1876) again examined this patient, and find that she now presents the usual symptoms of a slight hypermetropia and nothing more. Reading and sewing fatigue the eyes and cannot be long persevered in. When either eye is covered it deviates slightly inwards, but at once recovers its position on being uncovered. Double vision never occurs.

Glasses + 30 remove all difficulty. She says that the state of her eyes at the present time, namely, the difficulty and fatigue in reading and sewing (without glasses) is just such as it used to be before the attack.

CASE VI.—*Convergence in Excess, perhaps dependent upon Contraction of Tendons, and not upon Lesion of Brain-centre.*

F. J., a gentleman æt. 57, many years resident in India and lately returned to England, consulted me on account of double vision in the early part of September, 1876.

He stated that six months ago he suffered during several weeks from double vision. It came on without known cause, and to the best of his knowledge was not accompanied by any other symptom, excepting the consequent confusion and difficulty in walking. At the end of a week or two the double vision was quite recovered from. Three weeks before I saw him it had returned. The patient appeared in good health; he had no pain in the head or elsewhere; the last joints of one or two of the fingers of each hand were flexed and stiff, and the next joint in one finger was peculiar in that the articular surfaces seemed not to be properly in apposition, that of the distal phalanx being pushed somewhat backward over the edge of the other; the result was that the joint did not work freely but opened with a jerk; the patient said that he had had several attacks of prickly heat (lichen tropicus), and that in one of these the eruption had suddenly disappeared with immediate swelling of the hands and feet; the hands and fingers were flexed, and had remained in this position for some time after the disappearance of the swelling; the power of extending and using the fingers had been very slowly regained. The urine contained no albumen; the thoracic organs had been recently pronounced sound by an excellent authority; he had lately suffered much grief and anxiety from a domestic affliction, and was somewhat reduced in vigour and power of mental application.

The condition of the eyes was as follows:—Each eye had emmetropic refraction, and normal acuity of vision. In looking straight forwards in the horizontal plane, the eyes converged too much, and the excess of convergence was constant for all distances. It was barely neutralized by prisms of 5° with bases outwards. With the head exactly vertical, the images stood side by side on the same level horizontally, and they were both quite vertical; there was therefore no affection of the oblique muscles. On looking a little upwards the images stood nearer together (the convergence was diminished), and on looking con-

siderably upwards, single vision was obtained. On looking downwards the images stood further apart (the convergence increased). Each eye when tested alone, moved *upwards* and *downwards* to the normal extent, *inwards* to a little more, and *outwards* to a little less, than the normal extent; in short, except for the disturbing influence of the constant excess of convergence, the *parallel conjugate* movements were properly performed. The movements of convergence were also freely performed, that is to say, the amount of convergence was altered at will, but for every distance it was in excess. There is confusion as to the position of objects, and it is with difficulty that the patient walks alone in the street. Prisms of 5°, bases outwards, were prescribed for present use.

Bromide of potassium, in considerable doses, having produced no effect on the amount of the deviation as measured by prisms, small doses of strychnia were prescribed. At the present time, after four weeks, there is a very slight improvement. The prismatic glasses now neutralize completely, and afford much comfort. With their help single vision is obtained at all distances, and there is no difficulty in walking.

Prisms of the same strength combined with + 18 spherical lenses are prescribed for reading.

The foregoing cases are incomplete in many points, and in no instance has there been an opportunity of ascertaining the site and the nature of the lesion by post mortem examination. They present, nevertheless, points which appear to me deserving of notice. I venture to draw attention especially to the following facts and considerations:—

1. In Case I parallel movements were lost, while convergent movements were retained, a state of things which involves alternate conditions of paralysis and activity in each of the muscles concerned; for example, the internal rectus of each eye is paralysed or active, according as the attempted effort associates it with the external or the internal rectus of the other eye, a proof that it is actuated by two distinct brain-centres, one of which may be injured without loss of power in the other.

2. In Case I the parallel conjugate deviation was not accompanied, as it usually is, by hemiplegia; hemiplegia appeared later, when the eyes had to a great extent recovered their power of movement, and its onset brought with it no fresh deviation of the eyes. The ocular deviation and the hemiplegia both pointed to disease in the same side of the brain. I would further observe that, supposing the patient to have been accurate in his statements, the order of the return of power in the extremities was not the usual one, but no weight can be attached to this in the absence of more exact information.

3. In Cases I and II, which were seen within the first few weeks after the onset of the ocular deviation, the eyelids on the side from which the eyes turned were more widely opened and winked more feebly than on the other side. This was due to partial facial paralysis. In both these cases it was noted that the eyelids on the side towards which the eyes turned winked more frequently than in health. The exposure of the other eye, through paresis of its orbicularis, probably induced a more frequent effort to wink, and this effort acted in full intensity on the unaffected eye, feebly on the affected one.

4. In Cases I, II, III, after parallel conjugate deviation, the eye which turned outwards, that is, the eye on the same side as the brain lesion, recovered its movement at an earlier date than did the eye turned inwards; the internal recovered earlier than the external rectus.

5. Case IV forms a counterpart to Case I. The movements lost in the one were retained in the other, and *vice versâ*. In Case IV, the conjugate movements upwards and outwards, by which we look at a higher and more distant object, were lost; the conjugate movements downwards and inwards, by which we look at a lower and nearer object, were retained; the centre presiding over the latter movements, being unopposed, maintained the eyes in a direction downwards and inwards, and was able to produce a further movement in this direction, but did so with deficient steadiness and pre-

cision, in consequence of the lack of the balancing action of the opposing centre. Locomotion was much interfered with in this case. (See Dr. Hughlings Jackson on Representation of Ocular Movements in the Cerebellum, Vol. VIII, page 338 of these Reports.)

6. Variations in the amount of convergence are accompanied, in health, by corresponding variations in the amount of accommodation. In Case IV convergence was in excess, but there was no corresponding increase of accommodation—each eye alone could relax its accommodation in the normal manner for distant vision. It would appear probable that the centre for movements upwards and outwards has no antagonistic power over the accommodation. The *accommodation* of the eye for distance is purely passive, it is not action but suspension of action—the ciliary muscle has no antagonist. The *directing* of the eyes for distance, on the contrary, involves action, namely, contraction of the external recti and some other muscles. From this it follows that paralysis of the centre in question must produce increase of convergence (downwards and inwards), but no increase of accommodation; the internal recti, *without effort*, draw the eyes inwards because they have lost their opponents, the ciliary muscles gain no power because they have no opponents to lose.

The supposition, then, that convergence and accommodation are presided over by one and the same brain-centre, is not invalidated by the symptoms observed in this case. The well-known fact that the relation between the degrees of convergence and accommodation is not absolute, but admits of variation within certain limits (see Donders, p. 110), is apparently opposed to this supposition of a common brain-centre for the two acts; that it is not so will, I think, appear from considerations in the next paragraph.

7. In Case V the conjugate movements upwards and outwards were temporarily impaired but not totally lost. The hypermetropia probably played here an important part. The hypermetropic eye, in order to obtain distinct vision, must for every distance accommodate more than the normal eye; now if

convergence, as is supposed, is governed by the same brain-centre as accommodation, the hypermetropic eye must, for every distance, converge too much. As a fact, however, a large number of hypermetropic eyes preserve their parallelism, but they do so with an effort; the position of ease and equilibrium for the hypermetropic eye is one of more or less inward deviation. It would appear probable that the effort by which parallelism is maintained, represents an activity in the brain-centre which opposes the movements of convergence. If this be so, we have at once an explanation of the variable relations between the degrees of convergence and accommodation which exist within certain limits in all eyes. In the case of hypermetropia, the muscles of accommodation have to act in excess, *consequently* the muscles for convergence act in excess; *consequently* the muscles for divergence, if parallelism is to be maintained, have to act in excess also; hence the fatigue proper to the hypermetropic eye.

In Case V it appears that in connection with a temporary nervous disorder, the pathology of which I can make no attempt to explain, but which may be classed as hysterical, the centre for conjugate movements upwards and outwards became much weakened. That the affection was not, at any rate entirely, a spasm of the convergent and accommodative movements, is proved by the fact that although atropine removed the power of accommodation, and with it the tendency to excessive convergence, it did not by so doing at once restore the lost power of movements upwards and outwards. The latter returned gradually during the course of several weeks.

8. Case VI ought perhaps not to be included in this group of bilateral affections of the eyes. At first sight it certainly appears to be a case of bilateral deviation dependent upon central disease, for there was no discoverable paralysis of any one individual muscle, and the impairment of movement outwards was found to be present in each eye equally. But, on consideration, the supposition of a central lesion appears to be negatived by the following facts:—The amount of deviation

is constant for all distances, and when neutralising prisms are worn, single vision is obtained at all distances, and the movements of convergence are performed with ease and precision. This is quite at variance with the conditions in Case IV.

Again, movements upwards are neither lost nor impaired, which precludes the diagnosis of lesion in the centre for conjugate movements upwards and outwards, and the existence of a centre for simple movements of convergence in the horizontal plane has not as yet, I believe, been demonstrated or asserted. Symptoms precisely similar to those presented by this patient would, I imagine, be produced by a slight contraction of the tendons of the internal recti muscles. Whether such a cause was in operation here is a matter for conjecture only.

The flexed condition of the hands from which the patient suffered recently, and which still remains in certain of the fingers, is worth noting in connection with this suggestion, although it would certainly be unsafe to point to it with any stress.

## CASE OF CYST IN THE ANTERIOR CHAMBER.

By Frederick Mason,

*Surgeon to the Bath Eye Infirmary.*

Mary Ann Good, aged 71, came to the Bath Eye Infirmary on 14th October, 1875, and complained of pain and irritation in the left eye. She stated that twenty years ago she began to lose sight in that eye, but, not having pain, she did not seek advice for four years, when she applied at the Infirmary, and saw the late Mr. Boult, who said she had cataract. Eight years ago she was staying at a house in Bristol, where Mr. Prichard was visiting. He saw her casually, and also told her she had cataract. She did not ask further advice until the day mentioned above. She had never met with an accident of any kind to the eye. At the first glance (and knowing she had travelled some distance by railway, rendering it possible that some foreign body had entered the eye), I thought from the appearance that there were two particles of lime (white in colour) sticking on the surface of the cornea, but on more careful examination these were found to be in close contact with the inner surface of the cornea, or rather within a cyst which filled the lower part of the anterior chamber. The cyst was tremulous, semi-transparent, and filled with clear fluid, and, whilst under observation, expanded upwards so as to partially cover the pupil. It was unattached and loose in the chamber, for on laying the head towards the right shoulder the cyst sank to the most depending part, and the same occurred when the head was turned to the left. The pupillary space was clear; there was no appearance of cataract, and no perception of light. The eye was suffused with ciliary redness at the lower margin of the cornea, and latterly had become irritable and painful.

She was excessively nervous, and afraid of being placed before the lamp, therefore only an imperfect ophthalmoscopic examination could be made.

The fundus was of a creamy-white colour; the optic disc could not be seen, but I fancied I perceived some of the vessels of the retina.

She could not give me any idea of the length of time the cyst had been in its present position; but as it was now certainly setting up the irritation of a foreign body, I advised her to

become an in-patient, in order that I might remove it. This she did on the 19th October. On this day another attempt was made to examine with the ophthalmoscope. The vessels of the retina were not perceptible, but a dense yellowish-white film floated deep in the eye, obscuring all view of the fundus.

October 22nd.—*Operation.* The head being turned on the right side, the cyst dropped away from the point of an iridectomy knife with which an opening was made in the lower margin of the cornea to the full width of the knife: the head being now turned so as to lie on the back, the cyst came to the opening, and, being partially expelled with the aqueous, was easily seized with forceps, and removed. A portion of unhealthy-looking iris, against which the cyst had been resting, was drawn out and excised, and then an opaque body, which had been lying behind the iris, came into view. On attempting to remove this, it retired behind the upper segment of the iris, so that only the lower margin could be seen, and, after several ineffectual attempts had been made to dislodge and extract it, I thought it better to leave it for a future operation, if necessary.

This cyst not being the result of, nor following, any injury to the eye, and being unattached to either the cornea or iris, but lying loose in the chamber, did not resemble those cysts of the iris described by Mr. Hulke in the 6th Vol. of the "Ophthalmic Hospital Reports," and, being in doubt as to its real nature, I sent the cyst, with the portion of iris excised, to Mr. Hutchinson, asking him kindly to give me his opinion. He placed the specimens in the hands of Mr. Nettleship, to whom I am indebted for the following report.

"The cyst has collapsed, being open widely on one side. It consists of a hyaline, transparent membrane. Within or upon it, at different parts, there are groups or masses of calcareous granules, which dissolve with effervescence in nitric acid; collections of pigment granules; and numerous scattered cell-forms of the kind commonly met with in inflamed vitreous, viz., fusiform and multipolar corpuscles, and nests composed of several or many oval or rounded corpuscles, most of the elements of these nests being much degenerated. In parts the cyst-wall, seen in section, or acutely folded on itself, shows a distinct appearance of lamination, sometimes several, sometimes only two, layers being apparent; in thickness it considerably exceeds the healthy lens-

capsule, but resembles that structure in showing some tendency to curl up at the cut edges. No distinct evidences of the suspensory ligament were noticed. There was nothing resembling a hydatid.

"From the general characters of the cyst, I feel no doubt that it is the ruptured lens-capsule, somewhat contracted and thickened, containing small remnants of calcified lens, and having attached to it some shreds or membranes of vitreous in a state of chronic inflammation. The lamination observed is sometimes seen in thickened capsules.

"Attached near to the ciliary border of the piece of iris removed at the operation, was a mass of flocculent soft substance, which, when spread out, was much larger than the portion of iris. It contained a quantity of scattered uveal pigment, and in parts some round, rather small, corpuscles; it had no structure, but was of a stringy consistence, like the vitreous, and perhaps consisted of a portion of that substance, altered and mixed with pigment from the ciliary processes, or the back of the iris."

November 2nd.—The opaque body observed behind the iris, and which probably was the remains of the lens, has not again come into view. The pupillary space remains clear and black. Iris not inflamed; the wound healed; there is slight ciliary redness to the extent of the wound.

Ophthalmoscope: Light does not pass into the eye.

She wished to go home, and left the infirmary.

I can offer but little in explanation as to the reason why the capsule of the lens became separated from its attachments, and afterwards came into the anterior chamber. I can only suggest that, twenty years before, when she first lost sight, she suffered from choroido-retinitis, the vitreous then became complicated in the chronic inflammation, and afterwards the lens became opaque; so that at the time when seen by Mr. Boult and Mr. Prichard, the case would resemble an ordinary one of cataract. From some cause, shortly before I saw her, the lens swelled, and, being pressed forward against the iris, caused the pupil to dilate; the capsule ruptured, became detached, and fell through the dilated pupil, which, being relieved of pressure, afterwards contracted to its normal size. I think this could only have occurred a few days before, as she was only then beginning to suffer pain from irritation and inflammation.

# TWO CASES OF AIR-BUBBLES IN THE VITREOUS FOLLOWING PERFORATING WOUNDS.

By A. Stanford Morton, M.B.,

*Late House Surgeon to the Moorfields Hospital.*

The two following cases may be of some interest as illustrating a hitherto unrecorded condition, and also as showing how this condition may be mistaken for something totally different.

Case I.—Thomas R., æt. 42, came to this hospital, August 26, 1875, on account of an accident, after the surgeons of the day had left. Upon examining his right eye I found a penetrating gaping wound of the sclerotic with the vitreous presenting, situated about one-third of an inch from the lower and inner margin of the cornea; and caused, as the patient stated, by a small chip of steel which flew off from his chisel an hour or two previously. After dilatation of the pupil with atropine, I examined the interior of the eye to see if I could find the piece of metal which had caused the injury. The optic disc could not be seen owing to effusion of blood into the vitreous, but just above and to the outer side of the macula lutea there was a mass with a bright metallic lustre which I took at first to be the piece of steel. On closer examination I saw that the peculiar metallic lustre was caused by a bubble about as large as the optic disc, flattened, bright at the centre, and bounded by an uniform dark zone equal in thickness to about one-tenth of the whole diameter. A group of smaller bubbles was present on its surface, another group just at its margin, and a third collection of four or five completely detached from it to its lower and inner side. The whole of them had the appearance above described, which was in fact precisely that of a bubble of air as seen in a microscopic preparation, and I therefore concluded that the appearances could only be due to air in the vitreous humour carried in by the chip of metal. Twenty-four hours later only one of the bubbles was left and it was much smaller. Thirty-six hours after the injury not a trace of them was to be found, the spot where they had been being occupied

by a peculiar crescentic white patch, having all the appearance of sclerotic showing through ruptured choroid. The patient remained in the hospital for a few days, but as he suffered from no pain nothing was done to the eye. He returned just twelve months later at my request, when on examination I found extensive detachments of the retina, but could not see either the disc or the crescentic patch just mentioned. I may mention that the case was seen by Dr. Buller, now of Montreal, and Dr. Knapp of New York, both of whom fully concurred in the opinion that the appearances were due to air.

Case II is very similar to the preceding.—Alexander G., æt. 39, presented himself at the hospital on February 10, 1876, after the surgeons had left, having been struck a few hours previously by a chip of metal in the left eye, in the ciliary region, to the lower and inner side of the cornea. The field was very much contracted, vision remaining only at the part corresponding with the upper and nasal quarter of the retina. Being asked to examine the patient, because it was thought that a piece of metal could be seen in the eye with a distinct metallic lustre, and bearing the former case in mind, I made a careful inspection and found the lustrous appearance to be due, as in the former case, to three flattened bubbles placed in a row, and each one slightly overlapping the other. Each bubble was about as large as the optic disc, and they were situated about a disc's breadth from it, at the lower and inner part of the fundus. They presented precisely the appearances described in Case I, and Mr. Pye-Smith, who also examined the case, fully agreed with me that the presence of bubbles of air in the vitreous was conclusively proved by the peculiar appearances.

These two cases are instructive as well as interesting, inasmuch as in both it was thought that the lustrous chip of metal could be seen by the ophthalmoscope, but as shown in both this was an erroneous conclusion. Unfortunately the subsequent history of Case II is unknown, as the patient, though advised to remain in the hospital, refused to do so, and never returned.

# THE AFTER-HISTORY OF FIFTEEN CASES OF MALIGNANT TUMOUR OF THE EYEBALL.

By Edward Nettleship, F.R.C.S.,
*Surgeon to the South London Ophthalmic Hospital.*

In the following notes are recorded the present condition of some patients operated on for various malignant diseases of the eyeball, during the time that I was Curator of the Moorfields Museum (1871–73). They form a considerable majority of all the cases of this class, which were under care at the Hospital during the time specified; there were, however, several others in which I have not been able to learn the result. The interval which has elapsed since the cases were under care (from $2\frac{1}{2}$ to $5\frac{1}{2}$ years), is long enough to render it highly probable that those who have up to the present time escaped a return of the disease will remain permanently cured. In one case only (No. IX), the interval was too short to ensure a probability of permanent safety, and I have not been able to trace this patient since.

In the cases of sarcoma of the choroid (Cases I to X), we may note that when a return, either local or general, occurred (Nos. II, IV, VII, and VIII), there was always good reason to think that the primary disease had been in progress for several years before the removal of the eye; and that there was a strong family history of malignant disease in at least two of these (Nos. II and VIII). In three cases (Nos. I, VII, and VIII), there was a large growth external to the eyeball at the date of operation. The disease returned locally in two (Nos. VII and VIII), while in one of these two (No. VII), and in two others (Nos. II and IV), there were abundant deposits in distant organs; in (No. VIII) the evidence on this head is imperfect. In none of them is there any note that the lymphatic glands connected with the eye were

affected at any stage. The interval between the operation and return was considerable in Cases II and IV, but very short in Nos. VII and VIII, where the return was local.

In the five or six cases where no return has taken place (Nos. I, III, V, VI, X, and perhaps IX), the disease had begun about a year before excision in Nos. I, III, and X, and was of five years' duration in No. V; there was a family history, more or less strong, in Nos. III and VI; in one (No. III), the greater part of the disease was extra-ocular and deeply seated in the orbit; and in another (No. I), there were also some deposits on the exterior of the sclerotic, but only at the front of the globe; in both these cases, however, there was reason to think that the disease was of short duration. In one case (No. V), where the growth had probably begun five years before excision, it distended the eyeball, but had not visibly escaped into the orbital tissues.

Only four cases of glioma of the retina are included here. In two of them the removal of the eye has been successful (Nos. XI and XIII), and in both of these the disease was in an early stage and confined to the eye. In the other two (Nos. XII and XIV) there was a growth on the outer surface of the sclerotic, with doubtful infection of the optic nerve in one (XII), and very marked implication of the nerve in the other (XIV). In both cases the disease returned locally and quickly.

Some of the cases recorded below have already been published at greater length in earlier numbers of these reports, the others are now given for the first time.

Case I.—John Moules, æt. 62. Mr. Wordsworth. Melanotic sarcoma of ciliary body and choroid, giving rise at an early stage to secondary growths on the outer surface of the sclerotic in the ciliary region. No thinning or perforation of the sclerotic, the growth having extended along the perforating blood-vessels. The intra-ocular tumour constricted near its base. Retina still *in situ* at the part furthest from the tumour, and patient able to see shadows with this part. Duration of growth uncertain, but the first symptom definitely noticed by the patient was the appearance of one of the secondary growths on the sclerotic eight or nine months before

excision. No inflammatory symptoms at any time, and he applied on account of the defective sight. No family history of tumours.

Date of excision: September 30, 1871.

October, 1872.—Came at request. No return; health good.

October, 1876.—Writes that he is quite well and has had no return. (See Ophth. Hosp. Reps., Vol. VII, p. 385.)

Case II.—Martha Garrard, æt. 38, married. Mr. Critchett. Melanotic sarcoma of choroid with perforation of sclerotic and a large extra-ocular growth at the back of the eye to the inner side of the optic nerve.

Loss of sight, without pain, four years ago, soon after her sixth confinement. Two years ago first began to have severe shooting pain around the eye, &c. One year ago, soon after her last confinement, the eye noticed to be enlarging.

Cancer of breast in a sister.

History of loss of one eye, from inflammation followed by shrinking, in her father and in two of her sisters, one of them the same who died of cancer.

Eyeball nearly filled by the growth and enlarged and perforated. The tumour had a very broad base extending from close to the disc up to the ora serrata. Lens opaque.

Date of excision: August 4, 1871.

January, 1872 (five and a half months.)—A mass of healthy-looking granulations as large as a pea springing from centre of conjunctival scar, but not pigmented, and no signs of return of malignant growth.

September (thirteen months).—Husband states that she is in St. Bartholomew's Hospital for "tumour of the womb."

I was unable to trace her afterwards, but Dr. F. H. Champneys, Medical Registrar to St. Bartholomew's, has lately been kind enough to supply me with an abstract of the notes of her case while under care there. There was great abdominal enlargement, due to the presence of a large undefined nodular tumour seated chiefly in the right lumbar, hypochondriac, epigastric, and hypogastric regions; the nodules varied from the size of a pea to an egg. The liver dulness was very greatly increased. There were also three little nodules under the skin, one below the left breast and two on the abdomen. On admission she was supposed to have fibroid tumour of the uterus, but this organ was found to be healthy. She left the hospital in two months, and the final

result is unknown; but from the above facts there can be little doubt that she was suffering from extensive secondary malignant growths in the liver, &c. On admission, it is stated that the glands in both groins and in the left axilla were somewhat large, but those in the neck normal. (See Vol. VII, p. 389).

Case III.—Thomas Thomlinson, æt. 45. Mr. Hutchinson. Melanotic sarcoma, beginning at the region of the yellow spot apparently in the outermost layer of the choroid (lamina fusca, membrana supra-choroidea); passing outwards along the course of the perforating (short ciliary) blood-vessels, and producing a large tumour outside the eye, but none at all within the globe. Considerable proptosis. Symptoms began with proptosis about a year before excision.

History of cancer of nose in the patient's father and of tumour of the breast in a sister of the father.

Date of excision: January 15, 1872.—The tumour was about as large as a walnut, very soft, and surrounded by a thin capsule; it was easily turned out with the finger after the globe had been removed. Portions of orbital tissue, some containing melanotic nodules, were removed afterwards, and a second piece of the optic nerve removed as far back as possible. The tissues at the back of the orbit seemed healthy. Chloride of zinc paste was applied and caused sloughing of the greater part of the soft orbital tissues with exfoliation of some fragments of bone.

October, 1876.—Writes that he is quite well and has no return. (See Vol. VII, p. 611.)

Case IV.—J. Abel, æt. 45. Mr. Lawson. Spindle-celled, partially melanotic sarcoma of the choroid of right eye, probably of four years' growth; affecting a very large area of the choroid and invading the inner layers of the sclerotic. Optic nerve healthy. No reason to suspect that there were any visible extra-ocular growths in the orbit.

Date of excision: December 15, 1871.

January, 1873 (thirteen months).—Attended at request. No signs of local return; no enlarged glands in the neck.

October, 1875.—Admitted into the London Hospital with paraplegia as high as umbilicus, and involving the bladder and rectum. It had come on suddenly during a single night a month before admission. There was also a large hard mass in the right axilla probably attached to the scapula, of six or eight months' duration;

it was considered to be malignant. He died on December 9, two months after admission, from exhaustion due to cystitis. At the post mortem a large parsnip-coloured lobulated tumour was found attached to the under surface of the right scapula and extending into the surrounding muscles; it was inseparable from the bone substance. A tumour attached to vertebral arch at ninth dorsal pressing on the cord, which was here softened for an inch. Caries of spine at second lumbar vertebra but no change in the cord at that part. No malignant growths in thoracic or abdominal viscera. Brain appeared healthy. (Notes supplied by Mr. Roland D. Smith, Medical Registrar.) (See Vol. VII, p. 613.)

Case V.—George Aggus, æt. 50. Mr. Lawson. Melanotic sarcoma of choroid, filling the eye and causing perforating ulceration of cornea and considerable thinning and bulging of the sclerotic in front of the equator. Duration of growth probably five years, with long periods of quiet. No family history of cancer or tumours. No enlarged glands. No visible affection of the extra-ocular tissues.

Date of excision: April 2, 1872. Chloride of zinc paste applied to the orbit and followed by separation of a large slough, but some of the soft tissues remained.

Six and a half months later he wrote that he was quite well.

October, 1876.—In reply to inquiry he writes that he is quite well and has no return. (See Vol. VII, p. 615.)

Case VI.—An old gentleman, æt. 78, a private patient of Mr. Streatfeild. Unpigmented sarcoma (probably of choroid), originating in an eye which had been blind and shrunken for many years. The tumour passing through the hinder part of the sclerotic, infiltrating the optic nerve near the eye, and producing a large extra-ocular, well-circumscribed mass of growth. The entire tumour of large size and causing protrusion of the shrunken eye; consistence somewhat firmer than usual; composed of large spindle-shaped cells. No disease of the proximal end of the optic nerve. History of tumour, probably malignant, in a cousin of the patient, an old lady. Duration of growth in patient uncertain.

Date of excision: January, 1872.

October (ten months).—Mr. Streatfeild saw him, and found him in good health, and with no sign of a return.

I have lately heard from Mr. Streatfeild that the patient lived for two years after the operation, that he is reported to have died with "inflammation of the lungs and diarrhœa," and is believed to have had no signs of malignant disease. (See Vol. VII, p. 616).

Case VII.—Mr. Wm. F., æt. 69. Mr. Lawson's patient in private. Sarcomatous tumour, almost free from pigment, growing within and outside an eyeball which had been blind for several years from disease of cornea (probably large perforating ulcer). Previous history of an injury. Sarcomatous infiltration of choroid and retina, with signs also of chronic inflammation; tumour projecting from optic disc into vitreous; infiltration of optic nerve for a long distance behind the eye, and a large tumour surrounding the distal end of the nerve, and attached to the outer surface of the eyeball. Eye had been liable to attacks of pain for several years; proptosis began four or five months before excision.

Date of excision: January, 1872.

Mr. Lawson informs me that the patient died about eight months after the operation, with all the signs of secondary internal deposits in the liver, and perhaps in other organs. (See Vol. VII, p. 277, where a wood-cut of the specimen is given.)

Case VIII.—Emily Benson, æt. 53. Mr. Critchett. Melanotic sarcoma of choroid, completely filling the eye and extending through the sclerotic at the posterior part; the optic nerve so much affected that it could not be identified. Duration of growth five years or more. Sight lost, with symptoms of glaucoma, in one year. Three years before excision she consulted a distinguished oculist, and was advised to have nothing done, and that the eye would probably wither away. It shrunk for a time, and then began to enlarge, and at date of excision the front of the eyeball, itself puckered and shrunken, was pushed forwards by the growth behind. She had begun to lose flesh.

A sister died of a large tumour "in the stomach," which the doctor had attempted to tap without success. A paternal aunt died of cancer of the breast, æt. 50, and a first cousin (female) likewise on the father's side, died also of cancer of the breast.

Date of excision: March 8, 1872. Part of the diseased continuation of the optic nerve could not be removed. Chloride of zinc applied. No enlarged glands. It rapidly recurred

and filled the orbit; for a time she had intense pain, but this subsided.

February 12, 1873 (eleven months).—Died. The tumour had invaded the whole of the forehead and side of the face down to the chin, but she had continued free from pain. There had been passage of dark grumous blood from the nostrils. She died "in stupor." (Moorfields Register, No. 157.)

Case IX.—Ellen Murphy, æt. 45. Mr. Streatfeild. Melanotic sarcoma of choroid, confined to the globe. Duration of growth, judging by the history of symptoms, five years. Eye became blind gradually in about one year, and she had several months of pain after the failure had been going on for some time. It again inflamed a few weeks before admission. No known history of cancer or tumours in the family.

Date of excision: May 30, 1872. There was a yellowish cataract, and the eye was soft.

October 24 (five months).—No return; no enlarged glands. I have been unable to trace her since (Moorfields Register, No. 201.)

Case X.—Lavinia Barnes, æt. 18. Mr. Hulke. Melanotic sarcoma, arising in the ciliary body at the seat of an injury. Operation for traumatic cataract twelve months after the accident, and excision of the eye for pain and inflammation about five months later (a year and a half after the injury). The tumour as large as a small cherry, and confined to the ciliary body, but beginning to encroach on the iris and cornea. Family history wanting.

Date of excision: December, 1872.

July, 1875—She wrote that she was quite well, and had no return. (See Vol. VIII, p. 264.)

Case XI.—George Croydon, æt. 3. Mr. Critchett. Glioma of retina in one eye, of at least six months' growth. It extended into the vitreous instead of growing outwards, and the retina was not detached. A thin layer of glioma tissue was adherent to the inner surface of the choroid at the part where the retinal growth was largest; the pigment epithelium was removed from this part, but no penetration or infiltration of the choroid itself had occurred. There were also some clusters of cells on the ciliary processes, but here the pigment epithelium was undisturbed. Some clusters of glioma cells were found in a transverse section of the optic nerve close to

the eye, and at the time I described these as an "extension of the disease into the optic nerve." Subsequent examination of other specimens, however, has shown that the appearances above described were almost certainly due to the accidental introduction of some glioma tissue in making the section.

Date of excision: May 23, 1871.

August.—A large lump of granulation tissue was brought by the child's mother, it having recently come away from the orbit. (Microscopical examination).

December.—Still a good deal of muco-purulent discharge from orbit. No return.

September, 1876.—Mother reports him quite well. (See Vol. VII, p. 217.)

Case XII.—Thomas Jeffrey, æt. 4. Mr. Critchett. Glioma of retina filling the eye, and protruding at the ciliary region; another smaller growth on outer surface of sclerotic at back of eye; doubtful infection of optic nerve. Symptoms noticed for eighteen months before excision. The child's mother died young, with a history pointing to tumour in the nose.

Date of excision: August 27, 1872.

December.—Reported to be in good health and to have no return.

June, 1873.—Brought to the hospital again with a large hard mass filling the orbit and protruding the lids. An enlarged moveable gland the size of a chesnut in front of the ear, and a larger one adherent to the adjacent parts behind the angle of the jaw. (See Vol. VII, p. 609.)

Case XIII.—A child, æt. $2\frac{1}{2}$. Private patient of Mr. Critchett. Glioma of retina sprouting into the vitreous and not causing detachment of retina. Optic nerve not affected. Almost the entire retina the subject of general gliomatous thickening with more or less defined nodules. Vitreous clear, but patches of glioma cells adherent to its outer surface in some parts. Duration eighteen months or more, a white reflex having been noticed nearly a year and a half before excision. No pain. Eyeball less than half filled by the new growth.

Date of excision: August 1, 1871. Mr. Critchett removed a second piece of the optic nerve after removing the eye; somewhat troublesome bleeding was the result, and the actual cautery was needed in order to arrest it. Quickly recovered.

October, 1876.—Mr. Critchett informs me that he believes

the child to be still alive and well, having heard nothing of the case since the operation.

(Preserved in the Moorfields Museum, No. 6, Series V.)

Case XIV.—Alfred Hills, æt. 6. Mr. Critchett. Notes by Dr. Buller. Glioma of retina growing into the vitreous, and very nearly filling the eye; retina not detached, but its choroidal surface marked by little sulci. Patches of glioma adherent to choroid, but no evidence to the naked eye of infiltration of this structure. Ocular end of optic nerve thick and firm; a second piece removed, and its proximal end appeared healthy to the unaided eye. Duration of growth uncertain; symptoms ("something unusual in the eye") noticed by parents only a few months.

Date of excision: May 13, 1873.

August 18.—Came again with a return of growth nearly filling the orbit. Excised, and chloride of zinc paste applied and left in the orbit for one day.

He died on November 19th of the same year, with extensive local return of the disease, but no further details could be obtained from his parents. (Moorfields Register, No. 365.)

Case XV.—Alice Elder, æt. 27. Mr. Couper's patient. Growth, probably from its structure an inflamed sarcoma, from the right lachrymal sac. A tumour had been first noticed three years previously, and one year after its first appearance it was removed by Dr. Argyll Robertson. The patient stated that it was called a "fatty tumour." It recurred after removal, and a second operation was advised by Mr. Walker, of Edinburgh, a year after the first. It was afterwards seen by another oculist, who used probes for some weeks to overcome the obstruction, and then removed the growth. It quickly recurred and, about three weeks later, Mr. Couper again removed it (making the third operation), and three days afterwards applied chloride of zinc. No family history of tumours or cancer.

Date of Dr. Argyll Robertson's operation, about December, 1869.

Date of second removal, November, 1871.

Date of third operation, by Mr. Couper, December 12, 1871.

October, 1872.—Writes that there are no signs of a return.

I have not been able to hear of her since. (Moorfields Register, No. 120.)

Case XVI.—For the details of another case of melanotic sarcoma

of choroid with extra-ocular tumour, in which the disease returned locally, after excision followed by the application of chloride of zinc, the patient dying six months later with multiple deposits in various organs and in some of the bones, see the Pathological Society's Transactions for 1871-72, p. 251. The case is recorded by Mr. Andrew Clark, then Pathological Registrar at the Middlesex Hospital, whither the patient had been transferred after excision of the eye and tumour by Mr. Lawson, at Moorfields. There was no family history of malignant disease or tumours. (Moorfields Register, No. 60; Ellen Moore, æt. 62.)

## HOSPITAL CASES.

Reported by A. Stanford Morton, M.B.,
*Late House Surgeon to the Moorfields Hospital.*

### *Two Cases of Pannus treated by Inoculation.*

Case I.—Thomas D., æt. 33, was admitted, October 2, 1875, under the care of Mr. Bowman, suffering from a deep marginal ulcer, chronic ophthalmia and granular lids of the left eye; after treatment he was discharged, October 22, with the ulcer nearly healed. On January 3, 1876, he was again admitted, with the same condition, and was again discharged better; but as soon as he returned home he invariably became worse, and was re-admitted February 25. The lids were now treated with nitrate of silver, and the ulcer occasionally touched with the same, under which treatment the ulcer nearly healed; but the whole cornea becoming very vascular, Mr. Bowman performed peritomy, dissecting back from the margin of the cornea at least $\frac{1}{4}$ inch of the conjunctiva all round, and producing, as a result, only slight improvement. He was again discharged, April 8, but returned two days afterwards, worse. As no ordinary treatment seemed to succeed, Mr. Bowman determined to try inoculation. For this purpose the right eye, which was perfectly healthy, was secured from danger by a square sheet of india-rubber, with a watch glass securely cemented into an aperture in the centre, the whole being fixed to the side of the nose, forehead, and outer side of cheek by strips of strong plaster covered with collodion. Some white healthy pus from an infant four weeks old, who was recovering from ophthalmia neonatorum, was put inside the lower lid of the left eye: this acted well, and by the second day after the inoculation there were all the symptoms of acute purulent ophthalmia, which was left altogether without treatment, except a little tepid water with which the patient bathed his eye occasionally after the third day. About six weeks after the inoculation all discharge had ceased, and in the seventh week the right eye was set at liberty, not having suffered in the least. At the date of the inoculation the

pannus was so complete that the patient could not see to count his fingers; at his discharge, on June 16, he could read J. 20 at 6 inches. On October 28, he could read J. 4 at 8 inches slowly; the cornea was fairly clear and all inflammation had subsided, but he appeared to have had some iritis, the pupil being small and inactive.

Case II.—Henry W., æt. 20, was admitted, under the care of Mr. Critchett, on May 5, 1876, with complete pannus of both corneæ, ectropion of both lower lids, and great photophobia. He had suffered for twelve years, and on admission was unable to count fingers with his left eye, and barely able to do so with his right. He was inoculated by pus from an infant four weeks old, recovering from ophthalmia neonatorum, both eyes being done at the same time. On the second day it was evident that both had fairly taken, and, as in the last case, the only treatment was bathing with tepid water occasionally after the third day. By June 8 there was scarcely any discharge remaining, and the vision was, with the right, fingers at 14 feet; with the left, fingers at 6 feet. At date of discharge, July 1, J. 18 slowly with either. A few weeks later on, in August, he could read with the right, J. 2, and with the left, J. 8; and on October 28 he had further improved to reading with his right eye, J. 1, and with his left, J. 4.

*A peculiar form of Interstitial Keratitis in Secondary Syphilis.*

Under the care of Mr. Wordsworth.

(See Figs. 3 and 4. Plate I.)

The following case is interesting, as exhibiting an exceedingly rare, if not unprecedented, condition, viz., interstitial keratitis accompanying acquired syphilis. The patient, Annie P., æt. 25, was admitted on November 10, 1875, under the care of Mr. Wordsworth, and was also frequently seen and examined both as to the eyes, and the rash, &c., by Mr. Hutchinson and others. She had intense photophobia, great ciliary injection and tenderness, with haze in the centre of each cornea, and greyish-yellow deposits of lymph at the periphery, triangular in shape, with the apices converging towards the centre. On looking obliquely through the cornea each iris could be seen to be freely moveable to the stimulus of light. Her history was, that in the previous June, she had a

miscarriage at the third month, at which time her left eye inflamed, and, a month later on, her right eye also inflamed with violent pain; they became better, so that she could see well for a week; both, however, relapsing and continuing inflamed so that she sought advice here. Heurteloup's artificial leech was applied to each temple with considerable advantage, the congestion and pain becoming less, but the improvement was only temporary. She was then put on mercurial treatment, which was continued almost uninterruptedly until her discharge from the hospital. On examination she was found to have sores on her labia majora, like ulcerated mucous tubercles, though they were said to have come on as boils; a week or two after admission she also had a well-marked secondary syphilitic eruption, with slight sore throat, and during the last fortnight of December she had acute rheumatic pains in several of her joints, with swelling and increased temperature. On the 1st of December the opacities at the periphery of the cornea had assumed the form of striæ, reaching to the central opacity, and a minute blood-vessel could be seen, by means of a lens, to be present in each stria, in some instances running straight towards the centre, in others branching and anastomosing with neighbouring vessels. By December 5 the whole cornea was more or less opaque; the central opacity and striæ, however, remaining well marked and being distinctly *in* the layers of the cornea, as was the vessel in the centre of each opaque stria. The pain and tension increased, and on December 13 there was great œdema of the lids, and chemosis of ocular conjunctiva projecting in folds between the lids. These symptoms were subdued by the Heurteloup, scarifications of the chemosed conjunctiva, and warm fomentations, after which the eyes continued for some time as they were on December 5; sometimes the cornea being a little clearer, and the photophobia and tenderness less marked than at others. On January 6, 1876, the centre of each opacity presented a shallow depression, and looked as if about to perforate, but never did so. This state of things continued till April 25, when she had another attack of œdema, chemosis, and intense tenderness, relieved as before by leeches and fomentations. She was kept in the hospital till the end of May, when the opacities were no less dense, and the striæ with their vessels as well marked as ever, and at her discharge had bare perception of shadows. She returned in the middle of June,

being in the same condition as when she went home, and was again discharged. Re-admitted on the 1st of September; the cornea still presented the same appearances, vision only bare perception of light, tension normal, severe ulceration of alæ of nose and vomer, with psoriasis of palms and soles. She was then transferred to the care of Mr. Hutchinson at the London Hospital, and, just after her admission there, had another attack of œdema and chemosis with such intense pain, that, considering that her vision was almost absolutely nil, excision of the globes was suggested as the best means of relieving her of these attacks; but in the meantime the inflammation subsided, as previously, with leeches and fomentations. The patient still continues under Mr. Hutchinson's care at the London Hospital.

### *Hour-Glass Cyst of Iris following a Wound.*

Under the care of Mr. CRITCHETT.

(See Figs. 1 and 2. Plate I.)

Alfred P., æt. 13, was admitted, July 29, under the care of Mr. Critchett, having been wounded in the left eye with a piece of glass twelve months before. On admission, the spot where he was injured presented, at the lower and outer margin of the cornea, a yellowish, tense, subconjunctival swelling, a little larger than a split pea, reaching to rather above the lower margin of the undilated pupil, obscuring the corresponding portion of the iris, and reaching downwards about $\frac{3}{16}$ of an inch below the corneal margin. This swelling was at first thought to be a dislocated lens, but on examination the lens was found *in situ*, and just inside the margin of the pupil there was found another globular semi-opaque swelling reaching up between the iris and lens to near the centre of the pupil. The two swellings were diagnosed to be cysts, and a communication between them could be seen towards the upper margin of the outer cyst at a point where the iris was deficient. The vision in this eye was $\frac{20}{40}$, and with the hypermetropia of $\frac{1}{40}$ corrected V = $\frac{20}{30}$. On August 4, Mr. Critchett transfixed with a needle the anterior wall of the outer cyst, and excised it with a small piece of the iris which was in it, and both cysts became empty from the escape of their contents, which consisted of a perfectly clear fluid. Six days after the operation a small clear swelling began to appear at the

seat of the original cyst, and gradually increased in size till it became as large as a good sized pin's head; but the inner cyst did not re-form, and the vision was the same as before the operation. The patient was discharged, September 1. On October 14 he returned, complaining of having experienced intense pain during the night before; there was much congestion, and on examination pus was found in the anterior chamber. The swelling with which he had gone out had entirely disappeared, and instead of it was the small linear scar, such as was apparent immediately after the operation, so that it is highly probable that the small cyst had spontaneously ruptured, giving rise to the symptoms which caused the patient to apply for relief. Under treatment by warm fomentations and leeches the hypopyon and congestion disappeared in a few days, and the patient was discharged, on October, 23, with a linear scar, and no re-formation of cyst, the vision being as on first admission in July, $\frac{20}{40}$.

The following is Dr. Brailey's report of his examination of the cyst:—After the operation two fragments of membrane were found to have come away; one nearly colourless, composed microscopically of a thin structureless basement membrane, covered on one of its surfaces by an epithelium made of several layers of colourless cells, and showing on the other surface a little fibrous tissue, the whole probably representing the conjunctiva; the other darkly pigmented and, microscopically, exactly like iris tissue, excepting that on its uveal pigment layer was a thin structureless basement membrane, bearing on its posterior free surface a colourless epithelium of several layers of somewhat flattened cells. Supposing that the first described fragment represents the conjunctiva over the part of the cyst without the globe, and the second, the iris bulged through the sclero-corneal wound with the cyst-wall lining its posterior surface, this case will exactly resemble the one described elsewhere.

Fig. 1.

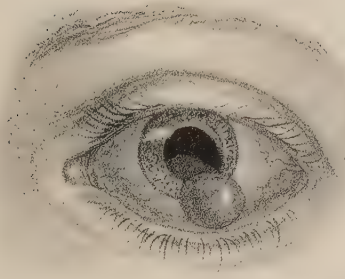
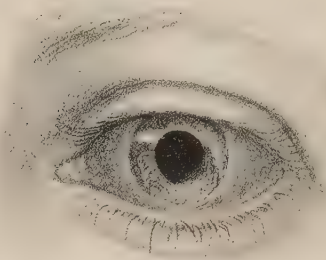


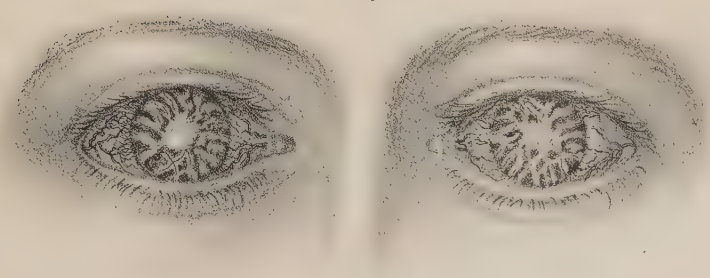
Fig. 2.



Cyst of Iris following a wound.

Fig 3.

Fig. 4.



Vascular Keratitis in Secondary Acquired Syphilis.

W. West & Co imp.

## CURATOR'S PATHOLOGICAL REPORT.

By Wm. A. Brailey, M.D.

### No. 14.—*Excision of the Globe containing Cyst of Iris following Extraction of Cataract.*

James B., æt. 67, under care of Mr. Hutchinson; a tall, thin, feeble man, with blue eyes and grey hair; *right* eye excised October 5, 1876; *left* has pupil active, tension normal, anterior chamber shallow, and V=$\frac{1}{5}\frac{0}{0}$.

In 1871 his eyes first began to fail; in 1873 cataract was diagnosed. He came here first in July, 1875, when both lenses were hazy, with opacities in all parts. The fundus just visible showed no abnormal change; a linear extraction with iridectomy upwards was done on the right. When seen nine weeks afterwards, the upward coloboma was nearly blocked by a greyish substance extending from above. An iridectomy was attempted downwards and outwards, and a week later detachment of retina was detected. Eleven months later he returned with a large greyish semi-transparent cyst filling the outer half of the chamber of the aqueous. There was ciliary congestion, and deficient tension.

After excision the eye was found to have its full measurements; the cornea was clear. On the nasal side the iris is seen *in situ*, thick and greyish white, its plane inclined rather backwards from its attachment. A large cyst fills the outer half of the aqueous chamber; its front wall has its outer part streaked with dark lines, as if the fibres of the iris were stretched in or over it, and its central and inner part thin and nearly transparent. The cornea was removed, leaving the cyst perfect, where a connection with the short stump of iris left by the last down and outward iridectomy can now be made out.

An equatorial section shows the sclerotic and choroid to be apparently normal, the retina detached, but scarcely at all contracted, a thin straw-coloured fluid between choroid and retina, and an absence of the vitreous.

The vitreous chamber is cut off from the aqueous on the outer side by the posterior cyst wall, extending from the summit of the ciliary processes, and internally by a delicate structureless epithelium-bearing membrane, which can be stripped off without rupturing the cyst, and which appears to represent part of the lens capsule.

The posterior cyst wall thus fully exposed, contains pigment in its external part, and becomes gradually converted into an internal non-pigmented nearly transparent layer, which arches forwards and becomes continuous with the corresponding part of the front wall, thus forming the internal arched summit of the cyst.

Horizontal sections through the external and anterior part of the globe show the cyst and its relations. Here the iris is rather shorter than normal, and is pressed against the posterior corneal surface and the periphery of the aqueous chamber; it has its usual structure, except that behind the uveal pigment layer it is lined by a layer of slightly flattened nucleated colourless cells, arranged several deep like an epithelium; this epithelium also lines the chamber as far backwards as the apices of the ciliary processes, but it can be readily detached from these and from the iris, and is then seen to be borne by an external structureless layer, carrying on its outer surface some globules of uveal pigment epithelium irregularly disposed and adhering to it. As it extends inwards beyond the limit of the iris and ciliary processes, it seems to consist solely of the structureless membrane and its epithelial lining, except behind, where it has also some scattered pigment cells on its exterior, and in front where some of the front nuclear tissue of the iris runs along and ends gradually on its anterior surface; the uveal pigment also runs up a less distance to end by a tapering extremity between the further extending iris tissue and the epithelium of the cyst. At the dome-shaped cyst roof other tissues have ceased and nothing remains but the structureless membrane with its epithelial lining.

No other connection of the cyst than the above-described adhesion to the wall of the posterior aqueous chamber can be detected. The continuation of the pigment of the iris and ciliary processes on its wall, as also of the proper tissue of the iris, may show that it originated by the union of the internal free extremities of these structures, the resulting cavity having been greatly dis-

tended by an accumulation of fluid within it, and acquiring an epithelial lining.

No. 22.—*Sympathetic Ophthalmitis following an old Injury.*

Thomas R., æt. 7. Right eye excised October 14, 1876, by Mr. Wordsworth.

In July, 1876, a boy accidently wounded his right eye with a nail which projected from a stick. He was at home a fortnight, during the first week of which he suffered great pain. Then he came here and remained in the hospital three weeks. When he went out the wound had healed, but the iris was entangled in it. Four weeks later it became bad again, and the eye looked dull and was much injected. In another week the sight of the left failed a little. At excision, *left* iris thickened, pupil irregular, slightly mobile, posterior synechiæ. Pupillary area of lens filmy. Tension not far from normal. *Right*—transverse wound at the lower and inner part of the cornea, to which the thickened and fibrous iris is adherent. Pupil drawn slightly to wound. Pupillary margin united to capsule of lens, which is here rather opaque; lens quite soft and clear. Ciliary processes opposite seat of wound drawn towards adjacent periphery of lens, to which they seem to be adherent. Here the ciliary muscle is soft, thick, and greyish. A thin greyish layer lines the internal surface of the ciliary processes all round.

The sclerotic is normal. The choroidal stroma is thick, its blood-vessels well developed. Its lining pigment is regular, except just behind the ciliary processes, where it is very dark, and so dispersed as to leave very frequent small circular patches where it is deficient, giving an appearance as if a black ground were punched into holes here.

The *retina* has its rods and cones, and its blood capillaries normal. In these, generally at their bifurcations, scattered groups of colourless corpuscles are collected On either side of these, rows of red corpuscles, evidently in a condition of stasis, are commonly seen. On the internal retinal surface are a great number of faintly granular colourless bodies of very delicate outline, sometimes round, though generally with a variable number of fine processes; sometimes very long and slender, and ending in a swelling which resembles the original corpuscle. They seem to

be altered vitreous corpuscles. The optic disc is a little swollen, and, together with the surrounding retina, is a little hazy. The yellow spot is decidedly greenish in colour.

The vitreous is slightly greenish in tinge and is more consistent than usual.

No. 769.*—*Wound of Globe followed by commencing Sympathetic Inflammation in the other.*

Lucy R., æt. 38, under care of Mr. Critchett. *Left* eye excised July 18, 1876.

Five weeks ago the left eye was wounded in the upper ciliary region by the patient running against a door latch. She was treated here as an out-patient. Three days before the excision the *right* became irritable and red. She felt a pricking pain in it, and the sight was dim. Now there are found to be two posterior synechiæ. The vision of this eye rapidly improved after the excision. The *left* eye was found to have a bulging at the seat of a healed wound just behind the upper and inner part of the sclero-corneal junction. At this situation there is a coloboma, as if the iris had prolapsed into the original wound. A section shows the iris to project half-way through the scleral wound close to the rim of the aqueous chamber, and to be fixed there. The *lens* is absent. Some soft lens matter is adherent to the iris near the wound. Round the front part of the ciliary processes is a whitish ring of lymph, and another along their posterior margin. A mass of vascular lymph continuous with this anterior ring fills up the coloboma of the iris.

The *cornea* is quite clear and the *iris* not much altered. The *sclerotic* is normal. The choroid is rather œdematous near the optic disc. This is swollen, and a whitish retinal opacity radiates from it for some distance, probably from retinal œdema.

No. 714.—*Punctured Wound in Sclero-corneal Junction involving the Ciliary Body, but escaping the Lens.*

Agnes A., æt. 6. Right eye excised by Mr. Hulke, April 26, 1876.

* The high numbers are in continuation of the cases in former Reports. The low numbers begin a new series.

Six days ago a drill wounded the right eye; immediate total loss of sight followed, with severe pain which has continued ever since. The globe presents a still unclosed penetrating wound at the upper part of the sclero-corneal junction. Behind this the peripheral margin of the iris is detached for a short distance. The wound has escaped the periphery of the lens, but has extended to the ciliary processes; for near their internal surface an eyelash is found in them, and in a clot of blood and lymph on their inner free surface another is found embedded. Just behind this the choroid and retina are slightly detached from the sclerotic. The *retina* is a little whitish and opaque all over; its yellow spot is dark. The optic *disc* is a little swollen. The *lens* is *in situ*, and quite clear. The *iris* is thick and greyish, and from its detached margin a blood clot extends over it, and hides the pupil. The *vitreous* is yellowish and detaches readily from the posterior half of the globe; near this surface it contains within it streaks of blood clot. *Left* has its pupil large and almost motionless.

No. 732.—*Microscopical Examination of an Increasing Corneal Opacity of peculiar character.*

Allan M., æt. 47, married, barman; operated on by Mr. Bowman, May 30, 1876.

A dark complexioned man, rather abstemious, and enjoying good health. When æt. 21, had what seems to have been a soft sore followed by a bubo, but by apparently no secondary symptoms. He has varicose veins in his legs.

The surgeon under whose care he was before he came here says that seven months ago the patient came to him with a small vascular point looking like a phlyctenula within the upper corneal margin. This got nearly well under tonics, the patient's health being very feeble at the time. Then he lost sight of him, and when he saw him again, one month or so afterwards, that part of the cornea showed a little way below its surface a white opaque area, but no loss of substance. On March 3, he came here with a large excoriated, softened, and vascular surface at the upper third of the cornea, but no granulations on the conjunctiva. On the 21st iridectomy downwards was done, together with a peritomy of the conjunctiva round the upper corneal margin. On

May 23 he came here with the opacity occupying rather more than the upper corneal third. The surface is smooth and there is no loss of tissue, and beneath it the opacity which appears to be in the cornea proper, is very white like a leucoma, and its convex lower border is similarly very white, with a very faint tinge of yellow. There are blood vessels on the opaque part, and it is larger than before the last operation. Mr. Bowman pared off the superficial piece of the cornea, apparently taking away most of the opacity; and on May 30 the cornea corresponding to the excised part looked semi-opaque, like half-coagulated albumen, and blood-vessels ran into it from above. On July 4 the opacity is said to be diminishing, but in the corneal area corresponding to the artificial pupil, there is a similar smaller opacity in which there is a dark streak, probably a blood vessel. Sections through the excised piece show, surrounding the diseased tissue, a nearly healthy margin where the epithelium and the superficial corneal lamellæ are normal, but the nuclei of the deeper lamellar fibres are multiplied, and are small, round, or elongated in shape, and irregularly disposed. Where the diseased part begins the epithelium varies much in thickness, and sometimes isolated bits are thicker and project out like papillæ, while the intervening epithelium is thin. Beneath this the anterior elastic lamina is normal, but the nuclei of the superficial proper corneal tissue are much multiplied, so as almost to conceal any other structure; more deeply very rare and feebly stained nuclei alone are seen, the tissue between which presents nothing of a lamellar or even fibrous structure, but seems rather molecular, as if fatty, though nothing like distinct oil globules can be seen.

It would seem as if the proper tissue of the cornea underwent some low form of inflammation with an increase of nuclei, and that afterwards a form of molecular degeneration occurred.

735.—*Cataract Extraction followed after six weeks by Sympathetic Irritation (? Iritis) of the other Eye. Excision and Examination of the Irritating Globe.*

George S., æt. 62, agricultural labourer, under care of Mr. Bowman, who excised the left eye, June 2, 1876.

For five years he has worn spectacles for reading, and two years ago he noticed that the vision of both eyes, especially the

left, was a little dull. The dullness, which was not accompanied with pain, continued to increase, and fourteen weeks before excision he went to a country hospital and was tested as to his vision. With the *left* he appears to have had V = $\frac{20}{200}$ according to his account, but he certainly could distinguish a small bottle in the surgeon's hand. On the next day the lens of the *left* was extracted, probably by an incision just within the cornea and without an iridectomy. On the second night he was feverish and restless and got the bandage off, and the eye was slightly inflamed. On the third day he was shown a glimpse of light, but then and since there has been slight inflammation and the eye has been a little painful at times. All perception of light gradually faded away from the left eye, and after he had been in the hospital six weeks slight inflammation came on in the *right*, and nine days ago this was accompanied with slight pain.

He remained in the country hospital eight weeks in all. On admission here, *June* 1, 1876, the *right* presented a rather contracted sluggish pupil, some ciliary injection and much lachrymation and photophobia. June 2, iridectomy upwards was done on the *right*, and the *left* was excised. Next day the anterior chamber was restored, the pupil dilated and there was a good coloboma. After this the eye gradually improved much, though six weeks later there was a small ulcer on the lower part of the cornea.

In the excised eye the globe was rather shrunken, the anterior chamber extremely small, the iris thickened with greyish lymph on its front surface which also blocks the pupil. At the upper and inner part of the eye there is a drawing in or indentation principally of the sclerotic, mostly behind, although it involves the scar of the operation wound, which is corneal and lies close in front of the sclero-corneal junction. An antero-posterior vertical section shows the retina to be contracting into an umbrella shape, still of course retaining its attachment to the optic disc and the ora serrata, and surrounded by a yellowish turbid fluid. The cornea is much thickened at and near the scar and to this the iris is closely adherent.

The sclerotic is thick near the scar but thin in the ciliary region opposite, and here the ciliary processes seem to be forcibly drawn in to the axis of the eyeball, probably by the contracting retina, so that the ciliary body has its tissue much stretched out.

The same thing occurs to a less degree behind the scar. The much stretched ciliary body seems to be infiltrated with an albuminous fluid.

Nov. 8, 1876.—Writes that his right eye is free from inflammation and pain, but that the sight becomes more dim.

767.—*Double Cataract Extraction, with an interval of Ten Days between the Operations—Iritis of the Second Eye (the Left) followed by failure of the other (probably Sympathetic Iritis)—Excision and Examination of the Left Eye.*

Sarah J., æt. 59, married; under care of Mr. Hutchinson. Left eye excised July 17, 1876. Globe a little diminished in vertical diameter and of rather deficient weight. Cornea clear. Artificial coloboma upwards, blocked by opaque whitish lymph.

*Retina* and *choroid in situ.* From the much swollen optic disc there runs forwards a delicate tubular membrane made of very indistinct fibres, which then expands into an umbrella-shaped termination and finally ends on the posterior border of the ciliary processes. Round this terminal part is the greenish glassy globe representing the remains of the vitreous; the posterior part, equal to two-thirds of the vitreous chamber, being filled with yellowish serum.

In 1870, she came here with considerable opacity of the right lens and striæ in the left. Pupils very sluggish and of medium size. *Right* counts fingers. *Left* $V = \frac{20}{100}$, and with $+ \frac{1}{7}$, reads J. 2. Both failing one year.

In April, 1876, right lens was extracted; linear operation. The eye did well, and ten days later the left was also extracted. After this operation there was severe iritis, and the pupil became blocked with vascular lymph. No anterior chamber. Tension normal. Perception of light only. At the end of seven weeks she left the hospital still in this condition, and returned four weeks later with the *left* painful at times and very irritable, but still good p.l. *Right* with $+ \frac{1}{2}$ reads J. 16 and $+ \frac{1}{3} \frac{20}{100}$. The sight is decidedly failing. There are dotted deposits on the posterior corneal surface and also opaque remains of capsule.

The failure of the *right* was thought to be due to sympathetic mischief and the *left* was therefore excised. Its subsequent examination is reported above.

Oct. 31, 1876.—Perception of light still remains in the right, with occasional shooting pain. In other respects it remains in the same condition as above reported.

No. 738.—*Enucleation of an Eye on the fourteenth day after Sclerotomy had been performed for old Glaucoma.*

Charlotte S., æt. 55. Right eye excised June 5, 1876, by Mr. Streatfeild.

Five years ago, pain and inflammation suddenly attacked the right eye, the cheek-bone, ear, occiput, and all this side of the head being involved in the pain. The sight, which had been failing a little for twelve months, now faded very quickly, and at the end of a month, though the pain had much abated, there was no perception of light. During the next month or two, there was a little occasional pain, and since then it has disappeared, except on very rare occasions, when there seems to be a slight cold in the eye. She had worn glasses to read with for two years before the first trouble. About seven months ago, she noticed coloured rings round a light with the left eye, and a month later the eye had an attack exactly similar to the outbreak in the other. This pain has lasted, off and on, ever since, and when it is severe the slight inflammatory attacks in the other eye are worse. The sight in this eye also rapidly failed..

On May 24, there was absolute glaucoma in both eyes. *Right* had T = + 3; no p. l. *Left*, T = + 2; p. l.

On May 25, iridectomy upwards on the *left;* sclerotomy upwards on the *right.*

Next day, the lens escaped from the *right* at the orifice of entrance of the knife.

29. *Right* painful; T = + 1. *Left*, pain much relieved. T.n.

June 1. *Right* very painful. Large staphyloma of incision.

June 4. Great pain in *right.* Eye bled last night. Chemosis to-day.

On the 5th, Mr Streatfeild excised the right eye. *Left* has no pain, and can see a hand move at four feet.

Sections through the sclerotomy wound at right angles to its plane show that the sclero-corneal junction has not been divided through its entire thickness, so that a superficial layer, consisting

of conjunctival epithelium, episcleral tissue and proper corneal tissue, is left uncut. The deeper divided part of the sclerotic tends to separate from the superficial uncut part, and to curve slightly inwards towards the centre of the globe, the two being separated by a layer of effused blood. The ciliary muscle and remains of iris apparently retain their attachment at the ciliary ligament, but behind this the ciliary processes and their continuation, the choroid, are bulged forwards by a large accumulation of blood, which fills the globe, and bellies them out like a sail, so that the internal surface of the choroid lies covered by the softened retina close to the posterior corneal surface. A second deeper row of pigment rises from the ciliary ligament, and, lying at first close to the curved portion of sclerotic as far as its anterior cut termination, then ends in a little irregular iris tissue, which is involved in the gap of the sclerotomy wound. In this neighbourhood, too, are found structureless fragments of membrane, probably the remains of the lens capsule.

766.—*Excision of Shrunken Globe. A condition somewhat similar, though probably in an earlier stage, presented by the other. No history of any illness.*

Laura S., æt. 9 mo., a fairly healthy-looking, well nourished child, with fair hair and blue irides, under care of Mr. Hutchinson. Left eye excised July 17, 1876.

Six months ago, there was noticed by the friends a white reflex, with blood-vessels on it, from the back of the left globe. Three months later, this eye was much inflamed, and remained so till the excision. A month ago, they noticed in certain lights a similar white reflection, though not bearing blood-vessels, in the right eye, but without inflammation. They then brought the child here, when the left cornea was found to be hazy and vascular. There was vascular lymph behind the pupil. The eye was shrinking. Tension probably minus.

Right eye presented a reflex from its fundus resembling glioma. Tension about normal.

At excision of the Left; its cornea is very small and very prominent. A deep brownish colour is behind it, apparently from blood in anterior chamber. Tension a little minus.

The right shows a white vascular reflex from fundus exactly like glioma. On its nasal side there is apparently perception of light.

The left excised. After excision, the left globe was a little squared. The *sclerotic* very thick behind; *choroid in situ*, pale brown. Inside this, a thick broad column extends from optic disc, and from a pointed attachment on its outer side to the back of the lens capsule. This is in the situation of the retina, but its exterior part appears to be made of a pinkish layer of organised lymph, with under it a coal-black pigment layer. Inside this is a greyish fibrous tissue, with two or three dark pigment streaks parallel to the other in it. Within all is a tough bluish white fibrous material, representing the remains of the vitreous. The outer pink layer seems to be fibrous, and the black pigment layers may be altered blood pigment from old hæmorrhages in or on the retina, which had its position somewhere in this tissue.

The anterior chamber is very deep, and full of blood. The pupil is quite closed by a thick layer of lymph, which extends all over the front of the iris. The lens is globular and opaque, and situated with its front surface quite behind the corneal border.

The choroidal stroma is of a whitish colour, bearing on its internal surface a light brown easily detached layer, made up of columnar cells much like an epithelium. These are $\frac{1}{1300}$-inch long, rounded at their attached end, near which they are slightly constricted. Their free ends are abruptly truncated. Fine brown pigment granules are collected rather towards this end of the cell. All the choroidal elements are present. The blood-vessels are few, and the branching cells of the stroma few, and but very slightly pigmented.

Arguing from this examination of the left eye, it would be inferred that the right is not a glioma.

Oct. 31. The child is well and strong; the right eye neither inflamed nor swollen. At times the father thinks there may be perception of light in it.

678.—*Retinal Glioma recurring after Excision of the Globe.*

Annie A., æt. 2. Right eye excised by Mr. Hulke, February 27, 1876.

A well-nourished very healthy-looking child, with brown hair

and grey irides. Six months ago the pupil of the right eye was observed to be larger than its fellow, but as the child did not seem to suffer, no further notice was taken of it then. *At excision*, Tension = + 2. Pupil widely dilated; ciliary veins enlarged; no p. l.

A longitudinal section of the globe shows a rounded tumour to project from the optic disc and fill nearly half the cavity of the globe. The disc is deeply cupped, its concavity being filled by tumour cells which depress the adjacent part of the lamina cribrosa, and extend also as a small conical plug, in or round a blood-vessel, for a short distance in the centre of the optic nerve. The choroid is *in situ*, but near the disc it is thickened by an extension of the tumour mass into it.

The ciliary retina extends forwards from near the surface of the tumour, and looks about normal; the lens and other media are clear. *On section*, the tumour is reddish, containing in front numerous hæmorrhages, and in its posterior part many calcareous particles. Microscopically, it is made of round or oval nuclei, which stain well, and which are surrounded by a thin scarcely staining periphery. In them can be usually seen one or two darker points, and a few indistinct granules. The appearance of more deeply stained areas round sections of blood-vessels with intervening less stained tissue, as in Case 645 (p. 69), cannot be made out, though about the centre of the tumour there is a less stained region made up of a few stained cells mixed with many times their number of cells scarcely stained and with faint outlines. The retina in front seems unaffected by the tumour, but its nervous layers are atrophied, and its granules form but a single layer. The deeper fibres of the lamina cribrosa present numerous well stained nuclei, as also the fibrous tissue within the optic nerve, and that forming its sheath, but between this and the nerve there is a large accumulation of cells exactly like those of the glioma.

The choroid near the disc is thickened with cells which conceal the blood-vessels and replace all its tissues except the lamina fusca, which appears to be unchanged. At a short distance from the disc the tumour cells cease rather abruptly, only extending a little further as rows of 3 or 4 cells, which give the notion that one has multiplied into several by longitudinal fission. For a little way now the choroid is free, but soon cells again appear between the vitreous lamina and the pigment epithelium; a little

further on both are again absent, and the cells extend from the overlying tumour between and around the blood-vessels of the choroid; soon the continuity becomes more marked, there being nothing but cells seen in the choroid though they appear to have something of a linear arrangement, probably from the arrangement of the remains of its stroma.

All the tumour cells found in the choroid stain well; in the ciliary muscle and the iris are crowded, numerous, small, round, or elongated well staining nuclei. The anterior elastic lamina of the cornea is not seen, and the columnar shaped cells of the deepest epithelial layer are not all disposed at the same level, some giving the idea as if entering the epithelium from the proper corneal tissue, and this is strengthened by many of the corneal nuclei, which are more numerous here, being arranged with their long axes at right angles to the corneal surface and appearing as if about to enter the epithelial layer; here are also found a few small blood-vessels. The rest of the proper corneal tissue with the posterior elastic lamina and its epithelium is normal.

In March it was reported that there was no return, the child being quite well.

In May the growth recurred and projected as a large mass from the orbit.

August 20.—The sight of the other eye is now entirely lost, probably by a retinal glioma.

September 4.—During the last day or two she has had several slight convulsions, and to-day she died. The tumour is described as appearing to be about the size of a common penny stone ink-bottle.

No. 655.—*Examination of an Eye, a portion only of whose Retina is implicated in a Gliomatous Swelling.*

Ernest L., æt. $2\frac{1}{4}$. Left eye excised by Mr. Bowman, January 7, 1876. A very healthy-looking, active, and tolerably forward child.

Ten weeks before excision he fell from a chair and struck his left eye against the fender, much ecchymosis round the eye followed, but the conjunctiva was but very little involved in it. A transverse scar a little above the outer canthus remained after the accident. About a fortnight later the area of the pupil was

noticed to be whitish, and on November 30 the child was brought to this hospital, and glioma was diagnosed; soon afterwards he frequently rubbed the eye, as if from pain. On January 7, they brought him here again, and a white woolly swelling was noticed bulging into the vitreous, on the lower and inner side of the optic disc, hiding this and projecting forwards nearly as far as the clear lens, and extending upwards and outwards so as nearly to touch the retina of this part. Floating shreds are seen on its surface through the clear media. The pupil is rather small and sluggish.

On opening the globe by a section passing through the centre of the tumour and the disc, its edge is seen to be 3 mm. from the optic disc, and the retina between the two is thickened and runs directly forwards, but not in contact with its choroid, so as to end in the centre of the tumour, from the corresponding part of the opposite side of which it again emerges, and then runs normally forwards as far as the ora serrata.

The retinal layer of the upper and outer part of the eye is normal in its position and relations, but close to the optic disc it is a trifle thickened. Microscopically this is due to a slight thickening of the granule layers, they being densely packed, and also by a pointed extension of close staining nuclear bodies from the optic nerve into the nerve-cell layer for a very short distance, and by a similar though broader and less dense extension into the nerve-fibre layer. These thickenings seem to go on *pari passu*, and at their termination the retina continues with its structure about normal.

The short thick layer running to the tumour is made up of closely arranged staining bodies like granules or glioma cells, containing near their exterior numerous blood-vessels. Just before it enters the tumour it is bent on itself in such a way that it is impossible to say whether its inner or outer part is in special relation to the tumour. There seem to be some indications that in this part of the retina the granule layers may not be so much thickened with the staining bodies as are the nervous layers, though they contain far more numerous blood-vessels.

In the tumour itself no distinction of retinal layers can be made out, but we have circular deeply-stained areas each with a central transversely cut thin-walled blood-vessel, or elongated areas made up of two parallel deeply stained columns with the blood-vessel between them cut longitudinally. Between these

are areas of much more feebly-stained cells without blood-vessels, and others again which seem simply finely granular and scarcely stained, but contain a few ill-defined stained glioma-like bodies.

Longitudinal sections of the optic nerve show it to contain rows of large well stained bodies like nuclei principally between its nerve-bundles; and also a few among them running forwards in rows to be continuous with those found among the nerve-fibres. The retina between the tumour and the ora serrata has its nerve-fibre layer atrophied, so that Müller's fibres are extremely well seen, and near the tumour its granule layers thickened. Here also the distal ends of the rods are swollen into fatty-looking knobs which in other places are detached as a fringe of globes. The choroid is normal in structure throughout.

Nov. 9, 1876.—The child is reported as being free from any sign of the return of the tumour.

### No. 645.—*Glioma of Retina.*

The Lateral Half of the Eye of an Infant, æt. 2 Months.

Presented by Mr. Lawson.

The sclerotic, choroid and lens are *in situ*, and to the naked eye unaffected. The growth extends from the optic disc filling up the entire cavity of the globe. Its central part contains numerous white calcareous-looking particles. No traces of retina can be made out in this view, but on cutting through the half transversely there is seen for a short distance between the choroid and the tumour a much-folded layer looking like retina and terminating at each end apparently in the tumour mass, which, though free from it at intermediate points, occupies its entire inner surface and extends beyond it at each end.

This retinal layer is very many times bent so suddenly and acutely that it is not plain which of its surfaces becomes continuous with the tumour, but the external seems to be the more likely one. At the convexities of the sharp bends the outer granules occupy increased space, but it is a question whether they are here much more numerous. The same applies to the inner granules, which are disposed in a precisely similar manner. The nervous layers are not involved in the folding, but run straight on. They present a greatly increased number of large

staining nuclei, these resembling much the granules and being also scarcely distinguishable from the glioma cells.

The rods and cones are short, their distal ends are swollen into colourless slightly granular globes which readily become detached. Close to the tumour these become less distinct and only a whitish granular fringe remains.

The tumour itself consists of roundish cells about $\frac{1}{320}$-inch in diameter, with one end generally drawn out into a short spike or process. The body, with the exception of a narrow circumferential rim and the spike, stains well. These cells are slightly granular, but present no distinct nuclei or nucleoli. The mass is extremely friable, but sections of it can be made with difficulty and they show many circular areas of deeply-stained cells, each with a central circular aperture which was probably occupied by a thin-walled blood-vessel. These areas are separated from each other by an intervening substance, the cells of which stain much less and of a somewhat different tint. Other sections appear to show the vessels cut through longitudinally instead of transversely, and here the same arrangement prevails, only we have two parallel longitudinal columns of well stained tissue with the thin-walled blood-vessel between them and surrounding all, less stained tissue.

Cross sections of the optic nerve show stained bodies having much the appearance of the glioma cells lying between and among the nerve-bundles and even lining the cavities of the central artery and veins. These appear to replace the ordinary nuclei of the fibrous tissue. The ciliary muscle and pars ciliaris retinæ are unchanged. The central part of the lens is granular and does not exhibit the usual fibrous structure, while the fibres of the periphery show well-marked nuclei.

The other eye, also gliomatous and painful besides, was soon afterwards removed. The patient died away from the hospital before there was any return of the primary tumour.

*Examination of a Glioma of the Retina.*

Specimen presented by Dr. Bell Taylor of Nottingham.

The pupil is dilated, and the anterior chamber very shallow. An equatorial section shows the sclerotic to be rather thin. The choroid is *in situ*. The retina is folded abruptly in from the ora serrata nearly to the centre of the posterior capsule of the

brownish rather flattened lens. Near the ora serrata it is about its usual thickness, then it gets thickened gradually, and from the back of the lens it extends back as a column, whose surface is marked with deep sinuous folds, to the optic disc. This column has a central canal containing the remains of the vitreous and occupies about one-fifth of the cavity of the globe. The other four-fifths outside this is filled with serous fluid. It appears as if the retina were detached into an umbrella shape, and as if a thickening of it had begun a little way from the ora serrata and extended back all the way to the disc.

Microscopical examinations of the column of thickened detached retina between the optic disc and the back of the lens capsule show it to be very brittle and to be made up of bodies from $\frac{1}{1500}$ to $\frac{1}{2500}$ inch in diameter, which are generally round or oval in shape and fiantly granular. Their central part stains fairly well, but they are surrounded by a very narrow margin which scarcely stains and which is drawn out abruptly at one or both ends into a short fine fibre. In the mass are numerous sections of very thin-walled blood-vessels. And the cells of the areas round these are well stained by logwood, while remote from them the staining is very slight. On cutting antero-posterior sections of the anterior part of the retina into which the thickening appeared to the naked eye to be only just extending, it was seen to consist of two layers of granules apparently not multiplied; outside them a few short colourless rods, with frequently knob-like ends, the representatives of the rods and cones; and inside them a few stained oval nuclei and a fibrous layer indistinctly longitudinal. As the retina approaches the tumour the inner granules seemed multiplied and occupied a greater area, sometimes blending with the outer granules, from which globule-like prominences of bodies similar to these projected on to the rod and cone surface, these being here deficient. Still nearer the tumour the multiplication of the inner granules is much greater, but they leave the outer granule layer unaffected and reach up to the internal limiting membrane through which they perforate, running along the internal retinal surface as a layer of cells many deep near the perforation, but finally tapering as it extends along the retinal surface till it ends as a layer only a single cell thick at its free extending edge. The cells of the tumour mass generally approach to round in shape. The somewhat multiplied nuclei of the internal retinal layers near

to but not actually involved in the tumour are generally oval or rather elongated.

Transverse sections of the optic nerve show many round stained nuclei between the nerve-bundles, much more numerous than normal, and some within the bundles. When the sections are teazed out the nuclei are found to be scarcely separable from the fibrous tissue, but some can be isolated either singly or in groups of two or three. They stain throughout, otherwise they bear a general resemblance to the glioma cells.

No. 631.—*Examination of a Globe containing a Sarcoma of the Choroid—Recurrence of the Tumour in the Optic Nerve Stump.*

Jacob C., æt. 48. Right eye excised by Mr. Critchett, August 17, 1875.

At excision, tension increased. Pupil widely dilated. Anterior chamber deep. Retina detached, except in front and at optic disc. The tumour starts from the edge of the disc by a pointed process which runs along the lower and inner part of the globe, getting wider and ending by a broad termination nearly as far forwards as and parallel to the ciliary processes. Microscopical sections of the choroid distant from the tumour show it to be normal, but close to it there is an increase of staining nuclei in the inner part of the choroid, especially round the cut sections of the blood-vessels, in proportion to the pigmented stroma cells. Further on, a thick, bluntly wedge-shaped mass of tumour cells extends from the tumour into this unaffected choroid, replacing entirely, except for a few scattered stroma cells and pigment granules near the sclerotic, the deeper half of the choroidal tissue. The superficial part of the choroid runs along the surface of this for a little distance as a diminishing and soon disappearing layer. The tumour is made, near this wedge-shaped edge, of bodies larger but of less distinct outline than the choroidal nuclei; their central part stains deeply, while a very narrow and indistinct peripheral zone scarcely stains at all. Sometimes this zone is larger, and embraces within it several nuclei, as if a larger cell had its nucleus divided into several. Among the deepest tumour tissue, and where this penetrates between the adjacent scleral fibres, the arrangement of the tumour cells appears to be

mostly linear. At two points near the centre of the tumour are areas of less stained tissue, having but a few stained cells, of which most are fusiform, scattered through a colourless, very faintly fibrous substance, which also contains many round bodies rather larger than tumour cells, having small, very faintly stained nuclei, and an aggregation of minute brownish granules on their surfaces. These may be degenerated tumour cells, with some blood pigment.

The tumour encroaches a little upon the optic disc, so as to push the retinal layers to one side. No special tumour cells can be found in the optic nerve, but the nuclei of the lamina cribrosa, and those between and among the nerve-fibre bundles, are round, deeply staining, and more numerous than normal. Close to the cut end of the nerve they are only moderately increased in number. The surface of the tumour is dark-grey in colour, though microscopically it exhibits but little pigment.

On April 28, 1876, the patient returned with a large mass filling the right orbit, and pushing the lids forward. He says that six weeks ago slight discharge, swelling, and pain came on, and have increased ever since. This growth was entirely removed by Mr. Critchett, its only connection, other than areolar, being to the stump of the optic nerve at the apex of the orbit. It is generally oval in shape, with an antero-posterior diameter of 18 lines, lateral 12, and vertical 16 lines. It is firm. Its front is marked into two lobes by a slight transverse depression.

The optic nerve is seen running along its inner and upper part for three lines; it then curves suddenly into the tumour, and lies about three lines below its upper surface. To the naked eye, its section appears simply fibrous and atrophied, but under the microscope a large number of staining nuclei, nearly as large as the tumour cells, and containing deeply stained point-like nucleoli, are seen between and within the atrophied nerve-bundles. Within the tumour, the fibrous nerve-sheath remains, but the area of section of the nerve soon becomes larger, and filled with dirty yellowish-white crumbly contents. These are made up of cells of faint outline, sometimes slightly granular, with occasionally a very faintly-staining, dot-like nucleus.

In front of the termination of the nerve, the tumour is blackish, with faint pigment mottlings, and in front of this again is a white fibrous-looking central part, and then the greyish anterior

part of the tumour. Behind the nerve there is a narrow zone, pinkish, as if from capillary hæmorrhage, and then again a peripheral greyish part. Scattered through the most internal part of the greyish periphery are spots looking like the yellowish crumbly contents of the optic nerve, and having the same microscopical structure.

The white central region is made up of fibres arranged parallel to each other, sending out small branches obliquely to unite with adjacent fibres, and containing between them large round cells, with deeply staining dot-like nucleoli. The peripheral part has a similar structure, but its cells stain better, and they are more abundant in proportion to the fibrous tissue. The dark mottled portion and the pink zone are similar, but the cells and nuclei stain less, and the fibrous tissue is more abundant, and among the fibres and cells are seen globes of various sizes, from half to double the size of the tumour cells, which are granular, from brown pigment deposits, and which may be either cells or simply agglomerations of pigment granules.

In fact it seems as if almost within the limits of one microscopical specimen many varieties of structure occur; in one place, cells which stain well and have but very little intervening fibrous tissue; near this, larger cells with staining dot-like nuclei in the interstices of large branching fibres; elsewhere close fibrous tissue, with either a few nucleated cells in it or pigment globes of various sizes; or simply degenerating cells of faint outline, with scarcely a staining point in one of them, such as are the crumbly contents of the optic nerve near its termination, and the soft yellow spots described in the tumour.

No. 687.—*Carcinoma involving the Superficial Layers of part of the Cornea Proper and adjacent Sclerotic of a Horse—No return of the Growth two months after Excision of the Eye.*

Specimen presented by Dr. Bell Taylor, of Nottingham. The patient is a cream-coloured horse, aged 8 years. The growth began in the sclero corneal junction, and gradually extended, till now it implicates five-sixths of the cornea, and extends 8 mm. into the adjacent sclerotic. Its central part is above the general corneal level and looks papillomatous, while its periphery is overlapped by healthy corneal tissue. The conjunctival

epithelium upon this, at first normal, then runs on as a thin patchy layer, and finally comes to an end before the superficial healthy corneal layers cease. Sections show that the superficial one-third of the cornea separates from the deeper layers which remain healthy, and that the gap so formed is filled by fibrous bands crowded with rounded nuclei, and containing alveolar spaces in their interstices. These bands appear to be prolongations of the proper corneal lamellar tissue, and the alveolæ formed by them are filled with cells, many of which, however, have dropped out in the sections. These cells increase in size from the periphery to the centre of each group; the outermost are not much larger than the neighbouring corneal nuclei, being about $\frac{1}{2500}$-inch diameter, while the central ones are $\frac{1}{1000}$-inch diameter or even larger. All have well stained nuclei surrounded by a wide margin of less stained formed material, and they have a general resemblance to the cells of the deeper layers of the conjunctival epithelium, but they are for the most part considerably larger than these. In the sclerotic and sclero-corneal junction the structure of the tumour is the same, and though a perforation to the interior of the globe, or some connection with the ciliary body or processes, was specially looked for, none was found.

Two months later the horse exhibited no symptom of tumour anywhere, was in capital health, and was reported as having just been the winner of a steeplechase.

### No. 789.—*Cyst of Iris—No History of any Injury.*

Arthur B., æt. 14, gardener's boy, fair-haired and well-nourished, with blue irides. Admitted June 16, 1876. Under care of Mr. Wordsworth.

Six weeks ago slight conjunctival injection, together with a "speck" behind the lower part of the cornea, first appeared. The speck got noticeably larger in three weeks, and for the week before admission he had a little aching pain in the eye which was the cause of his applying at this hospital. Reads 1 J., and with $-\frac{1}{60}$, V = $\frac{20}{20}$. The other eye is quite unaffected.

A cyst extends from the lower part of the anterior chamber nearly up to the margin of the ordinary sized pupil. The lower part of its posterior wall is formed by the deeper iris tissue, and appears black, though by oblique illumination it has a reddish

tinge, as if from great vascularity; the remainder, including the front wall and dome-shaped roof, is quite thin and transparent, and appears to be the superficial iris tissue. Mr. Wordsworth made with two needles a rent in the thin anterior wall, when the cyst collapsed almost entirely. In this condition it was when the patient left the hospital two weeks later.

Three months later things were just the same, the cyst wall, though still visible, remaining undistended. The injection has entirely disappeared, and there is no pain.

Two drawings of this case are preserved in the Museum of the Hospital.

No. 679.—*Examination of a Globe which presented some features of Myopia.*

Mary B., æt. 57, spinster. Left eye excised by Mr. Critchett, February 29, 1876. A flabby looking woman, with light-reddish hair, and bluish-grey irides. A few days before excision she struck her toe against a stone, and fell with her left eye against an iron railing. Four days afterwards she came here, and was treated with belladonna fomentations; then much pain in the eye came on, and the other became weak and its sight a little dim. Now the *right* reads 3 J. at 12″. Unfortunately it was not fully tested; its pupil is very small; there is a slight central corneal nebula. She never, she says, noticed any special deficiency of sight in either eye. The *left* has bare p. l. T = — 2; globe ruptured along inner and lower half of sclero-corneal junction. The iris behind this is detached all round this part of its periphery, and is prolapsed into the wound, elsewhere it is thick and dull, but is free from adhesions. The cornea is slightly hazy at its centre; the lens substance is soft and glue-like, and very small in quantity. The globe is large, especially from before to behind, and has much the appearance of a myopic eye. An equatorial section shows the posterior part of the vitreous to be fluid, and pale yellow in colour; its anterior part is firmer, and contains hæmorrhages close to the ciliary processes behind the seat of wound. The choroid and retina are *in situ*. The optic disc is a little swollen, and its vessels a little diminished; it presents a shallow depression towards its outer part, the bottom of which is about level with the general retinal surface, while the margins of the disc are a

little raised above this. Surrounding the disc is a circular white area, like a posterior staphyloma, rather more extended on each side of its lower part, but more especially outwards. Occupying the region of the yellow spot is a white atrophic area, about one-sixth inch in diameter, presenting on its surface a few black streaks; this nearly reaches up to the margin of the white area round the disc, and it presents beyond its outer border two similar smaller patches, and below them a small dark-grey spot. The whole choroid is of a pale yellow-red colour. Just behind the ciliary processes are some small black superficial looking spots.

Microscopically, the projecting margin of the optic disc is made of loosely arranged fibres containing round well-stained nuclei. In the nerve the nuclei are large and well-stained, and arranged principally in rows between the nerve-bundles; others follow in rows the course of the fibres of the lamina cribrosa. In the tissue of the sheath of the nerve also the nuclei are well seen; indeed, in this specimen, they are as prominent in the nerve on section as in Case 678 (p. 65).

Close to the disc there is but a single granule layer in the retina, and the rods and cones, with the pigment epithelium and vitreous lamina of the choroid, are wanting, while the choroid is extremely thin, and the branching brown pigmented cells of its stroma are very rare.—Nearer the margin of this white area a second thin layer of granules appears, and beyond this some short and thick bodies representing the rods and cones, whose distal ends are swollen into colourless globes which frequently lie separate. Just before these rods and cones begin, a very thin layer of cells with faintly stained nuceli, and very faintly pigmented bodies, represents the pigment epithelium. This soon becomes thicker, and then, while it in one place seems normal, in another it is either wanting altogether or extremely thick and darkly pigmented; only where it is normal are the rods and cones and outer granules seen. The other retinal layers are about normal, except that the internal limiting membrane is very much wrinkled, while the choroidal stroma presents the same characters as close to the disc.—Sections through the white patch about the yellow spot show no precise distinction between retina and choroid. There is an outer thin stratum of elongated, frequently spindle-shaped, fibres parallel to those of the sclerotic, and containing round or oblong stained nuclei, but

no pigment; these probably represent the choroidal stroma. Within this there is a thicker layer of more numerous, round, stained bodies, embedded in an indistinctly fibrous matrix, probably representing the tissue between the pigment epithelium, and outer choroidal stroma. Then most internally is a more open fibrous layer with round or oblong nuclei, this probably representing the retinal framework with the remains of its different layers. No sections of the edges of this patch can be found to show the precise continuity of these with the normal retinal and choroidal tissues, but those already described from near the disc show the retina and choroid much simplified by the loss of their pigment, rods and cones, and outer granules.

It is interesting to notice the similarity of microscopical structure between this case near the optic disc, and Case 609 (Vol. viii, p. 552), which has been described as one of choroditis disseminata.

No. 4.—*Swollen Optic Disc following recent Wound.*

Richard W., æt. 4. Right eye excised by Mr. Wordsworth, September 20, 1876. Four days ago he fell with a knife in his hand and cut across the cornea, through the lower lid, at the junction of the upper and outer third with the rest, the incision extending $\frac{1}{4}$-inch backwards into the sclerotic at each end. The *lens* is soft. The *retina* and *choroid in situ.* The *optic disc* swollen, and there is a whitish haze over and around it. Its arteries are rather small and its veins a little enlarged outside the disc, though on it they are even rather small. At one point in the retina, near the disc, is a fine brush-like capillary hæmorrhage, Microscopical sections show the optic disc to be decidedly swollen, and the swelling is chiefly behind the deep retinal surface, so that the retina is, as it were, lifted up away from the scleral nerve entrance, with which it remains connected by the fibres as a thick pedicle. The retina contains all its layers. The choroidal stroma is probably œdematous, containing numerous dilated blood-vessels. It also contains round the walls, and scattered through it, numerous nuclei which stain well.

No. 3.—*Eye lost probably by Corneal Ulceration eight years before Excision—Changes in Retina and Choroid.*

Ann L., æt. 24, single. Right eye excised by Mr. Bowman, September 19, 1876.

A rather delicate consumptive-looking girl, with blue irides. When æt. 16, whilst in the third week of convalescence from an illness said to be low fever and whooping cough, a sudden inflammation of the right eye came on with photophobia, lachrymation, and swollen lids. It was treated with leeches, fomentations, &c., but it got worse, and in a week she had only perception of light. Then the pain, which had been very severe at first in that side of the head and in the temples, got better, and the eye got quiet. The left was unaffected. Three years after this, she says, she was operated on here as a preparation for wearing an artificial eye for the right, there being no sight in it. In fourteen days she began to wear the eye, which caused irritation directly and ever since. During the last twelve months the discharge has been greater, and the *left* has not been so strong, for it pricks and runs occasionally. Its V = $\frac{2}{20}$ barely, H = about $\frac{1}{30}$. The *right* is now slightly shrunken and squared. Its tension is normal. *Cornea* small, oval transversely, margin bluish, central part white, opaque, and moderately vascular. The *sclerotic* is thickish behind, but thinner as it passes forwards. *Choroid* is *in situ*. Extending from optic disc to the upper and inner side, where it expands to form a large patch, is an area full of dense black dotted pigment, and with also some superficial looking white streaks on it. The *retina* is *in situ*. The *optic disc* is swollen and its blood-vessels small. In front of these, on the side towards the yellow spot, is a thin bluish white haze of opacity. On the ciliary processes below, there is a thin layer of lymph. The vitreous is rather fluid.

The retina at the periphery shows a dark coloured network, apparently the retinal blood-vessels. This seems to be due to an aggregation of indistinct rounded or irregular bodies containing black pigment, in or on the walls of the blood-vessels. Another specimen taken from the retina over the mottled patch shows these dark streaks more clearly, and many of them lead into darker patches similarly made up, which appear to bear the same relation to the streaks as do the capillary dilatations sometimes met with in glaucomatous eyes to the retinal vessels themselves.

The choroid of the mottled patch is closely united with the retina, and sections of both show the lamina fusca and an outer layer of stroma to be normal. Then the inner choroidal layers are replaced by an irregular mass of coal-black pigment,

which appears a little fibrous in arrangement. The retinal pigment layer and the outer granules are deficient, and their place is occupied by some thin, irregular, longitudinal fibres, containing a few scattered nuclei. Inside this is the inner granule layer, and inside this the atrophied nerve-cell and -fibre layer containing the above described dark streaks. These are found rarely through all the structures internal to this coal-black choroidal pigment.

In other places the choroid has all its layers perfect and its stroma well developed, though towards its inner part there are occasional indications of an accumulation of pigment. There are extremely few staining nuclei scattered through the choroidal tissue; near the yellow spot the retinal structure more approaches to normal.

The retinal layers are perfect near the optic disc. Their pigment epithelium runs nearly, and the vitreous lamina of choroid quite up to the disc.

No. 5.—*Chronic Glaucoma—Nuclear Cataract—Old Iritis—Cystic Degeneration of Peripheral part of Retina.*

Eliza B., æt. 56, married. Left eye excised by Mr. Streatfeild, September 21, 1876.

The *cornea* is rather convex, clear except just below its centre, where there is a slightly raised semi-opaque patch. The *sclerotic* is about normal. The *choroid* has its stroma but moderately developed, the epithelium lining it is perfect. The rods, cones, and blood-vessels of the retina all seem normal. The yellow spot is of a marked yellow colour, and the optic disc deeply cupped. The lens is *in situ;* its periphery is clear; its central nucleus is amber-coloured and opaque. The pupil is of medium size and rather irregular; its margins are adherent in several places to the front surface of the lens; the iris is thickened and dull; the vitreous is normal.

Sections of the lens show its nucleus to be soft and stickey; it has a fibrous structure, but the fibres seem to be swollen and to tend to cohere into short columns or blocks; the peripheral part is nearly normal; sections of the *cornea* show it generally to be normal, but in one place its anterior elastic lamina is wanting, and in its position is some indistinct fibrous tissue containing

numerous round or irregular nuclei which stain readily, and are traversed by capillary blood-vessels. These nuclei pass gradually into those of the cornea proper below them.

The retina and choroid of the posterior part of the eye seem to be nearly normal, the latter containing a fair number of nuclei and blood-vessels; but as we advance in front of the equator, the rods and cones seem short and knobbed at their extremities, and still further forwards the radiating retinal fibres, which are well developed, separate and enclose between them spaces which at first scarcely encroach on the granules, but as the retina passes further forwards begin to do so till we have nothing on the inner side of these large spaces but the thin nervous layer, and on the outer surface but the basement membrane which here supports no rods or cones.

Close to the ora serrata the retina becomes gradually about one-fourth thicker than at the periphery, and it is made up of little but the thin nerve layer and this row of spaces separated by Müller's fibres and a few granules.

Here the choroid is about half the retinal thickness.

The patient is a thin weakly woman; she has always had ample food. She came here in 1870, with chronic glaucoma of *left* eye, deep cup, and bare p. l. The *right* was normal, no operation was then advised.

For the last two years there has been severe pain in the *left* every two or three days, lasting twenty-four hours or longer, and now she comes with *left* T+2; no p. l. *Right*, sight failing, V=$\frac{20}{40}$, T=+? Left excised.

No. 6.—*Punctured Wound of Cornea, Iris and Lens, with Prolapse of Iris—Lens Substance Soft but Transparent—Optic Disc Swollen.*

Henrietta E., æt. 13. Left eye excised by Mr. Hutchinson, September 25, 1876.

On September 15, the left eye was wounded by an awl; two hours afterwards trifling aching pain came on which lasted for twenty-four hours only. Next day she attended here, when there was slight hypopyon and prolapse of the iris. On the 18th, the hypopyon was increased, but the pupil dilated well. The lens was clear. There was ciliary injection and a greenish reflex from

the fundus, but no pain; good perception of light and normal tension. 21st, Less hypopyon. Condition then and at excision much the same.

At excision the pupil was a little drawn to the upper and inner part, where a small scar close to the corneal margin indicates the original wound. The iris is thickened. The vitreous is greenish, opaque behind, and readily separating from the retina there, glassy in front where it is traversed by white streaks of lymph radiating back from the semi-opaque lens capsule near the wound; here also it can be readily stripped from the ciliary processes, leaving them quite free from lymph.

The iris is closely adherent to the corneal scar, which is in such a position that the lens must have been wounded. The lens substance is soft, though quite transparent. The choroid is normal. The retina near the swollen optic disc is milky, with a few whitish dots on its surface. The right eye was quite unaffected throughout.

No. 7.—*Examination of an Eye lost after Extraction of Cataract.*

Peter B., æt. 50. Right eye excised by Mr. Hutchinson, on September 25, 1876. A man of fair bodily health, though very nervous.

Six years ago his wife noticed a white appearance of the *right* eye, and on attending at one of the Metropolitan Hospitals, it was found to be nearly blind from cataract, and an operation was offered. The patient preferred to be treated as an out-patient, and went home, a distance of three miles. After the operation, when he got home there was a little pain in the eye, lasting some time. There never was any vision after the operation. The *left* was never inflamed.

On *excision*, the globe is normal in size, its lower corneal third occupied by a whitish semi-translucent vascular opacity, involving the whole corneal thickness; to this the *iris* is closely adherent; with it also and with the iris is closely connected a tough white fibrous plate, probably representing the lens capsule. The *sclerotic* is normal. The choroidal stroma is thin; a whitish patch is seen near its periphery and another just behind the ciliary processes. The *retina* seems normal, the *optic disc* swollen, its arteries small, and its veins about normal. The tension of the eye is normal.

The *left* counts fingers at six feet. Tension normal; pupil active; lens opaque; no irritability. Till one year ago this eye had perfect vision, but for this last month there has been much more rapid failure of sight.

No. 10.—*Wound of Cornea, Iris, and Lens extending two lines into Ciliary Region—No Sympathetic Irritation.*

Jesse P., æt. 14. Right eye excised by Mr. Hulke, September 30, 1876.

Seven weeks ago the eye was wounded by the explosion of a ginger-beer bottle. In the first two weeks he had no pain, and had bare p. l. Then he came here and was in-patient for a fortnight. Then he went home for three weeks, but the eye got a little tender, and there was some ciliary injection: on which account he was advised excision. The other was unaffected.

There is a wound across the cornea, at the junction of its upper third with the rest; its inner end extends two lines into the ciliary region. The pupil is small, its upper margin with the iris all along the scar is involved in the corneal wound.

The *lens* is quite soft but transparent. The retina at the upper and outer part of the globe is detached; and at the ciliary region, where the wound extends, the sclerotic, choroid and retina are united together by a white firm cicatrix.

The choroid and retina appear to be normal in structure.

No. 764.—*Examination of a Globe which has caused Sympathetic mischief.*

Fred. D., æt. 15. Left eye excised by Mr. Hutchinson, July 13, 1876.

Globe oval transversely, smaller than normal. Lower part of cornea a little dotted and irregular, with superficial calcareous-looking deposits. A faintly-seen rim-like iris lies in the periphery of the anterior chamber. The pupil is closed.

The *sclerotic* is thick. The *choroid* is dark coloured, and rather soft and velvety in appearance generally, though its inner part has fine mottlings of lighter greyish red. The retina is *in situ*. The optic disc white and not cupped. The anterior

chamber is absent, and behind the iris, and closely adherent to its pupillary margin and adjacent posterior surface is a tough scale visible through the cornea representing the lens. The ciliary processes above have a fine whitish grey deposit on them. They do not appear to be stretched away from their attachments.

When æt. 7, the left was injured by a tipcat. Two years afterwards the right eye began to fail, and its vision is now reduced to perception of shadows.

No. 771.—*Glaucoma in an Eye which has been previously Operated on for Cataract.*

William F., æt. 67, a very grey, though strong and hearty man. Right eye excised by Mr. Lawson, July 18, 1876.

Fourteen years ago he was operated on here for cataract of right eye. It was probably a flap extraction. A third of the vitreous was lost then.

Afterwards the pupil was irregular, but the case did well, and he could read the smallest print with the eye by the aid of glasses. He after that wore + $3\frac{1}{2}$ for *each* eye, with which he now reads J.1 with the *left*, though he reads J.4 or J.6 as well with + $\frac{1}{10}$ as with the stronger glass. For eleven years he got on well with both eyes, and then constant pain, at times extremely severe, came in the *right*, and the eye felt to him as hard as wood. It used to beat just like a "pulse." In about a year it caused a dulness in the *left*, which has been increased during the last nine months. He has had occasionally also in this eye a hemiopia, the left side of objects not being visible. Since the excision the vision of the *left* has much improved.

*At excision* the right cornea was hazy, vascular, and bulging. T+1. No p. l. Often severe pain. The pupil is large, oval ransversely, and rather displaced towards the upper part of the cornea. The iris is short above, and entirely adherent in its upper third to the cornea. The scar of the old operation wound is not distinct, but it appears to be upwards and well within the cornea. The rest of the iris is tremulous, and a little thick and greyish. There are no remains of the lens or its capsule visible. The sclerotic is a little rigid, but about of normal thickness.

The *choroid*, just behind the ciliary processes, is pale, and has dark mottlings here.

The *retina* is slightly detached above. The disc is deeply cupped. The vitreous a little fluid. The ciliary processes are rather greyish and irregular, as if from atrophy.

It would appear as if a flap extraction, through the pupil, had been originally done, and as if the results had been extremely good, though there was an extensive anterior synechia above. Ultimately, however, glaucoma came on, for which the eye was excised. From his wearing similar cataract lenses for each eye, one might infer that the left (which has not been operated upon) was not a good eye at the time of operation, and that it has changed very little since then.

He has always had good health, and has drank beer and smoked tobacco freely.

No. 773.—*Enlargement of Globe, especially of Anterior Chamber, possibly Congenital.*

Arthur D., æt. 5. *Left* excised by Mr. Hutchinson, on July 20, 1876. The globe was increased in all its diameters, especially the antero-posterior, a great proportion of the enlargement being in front of the iris. The cornea is quite clear; its curvature is apparently uniform. The iris is normal; the pupil circular and of moderate size. The *sclerotic* is rather thin, especially behind the insertions of the *recti* muscles.

The *choroid* is elastic, deficient in pigment, its veins distinctly seen. The optic disc not cupped, its blood-vessels rather small.

The *lens* clear and *in situ*.

He is rather delicate looking; did not walk till three years old. When æt. six weeks the eye was noticed as being a little larger than the other. Since that it has been gradually increasing in size. For the last two years he has seemed to suffer a little pain in it. The other eye has never been affected. The family is a delicate one. Two of the other children have died in convulsions.

PART II.

# A Periscope

OF

## CONTEMPORARY OPHTHALMIC LITERATURE.

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*Operations for Traumatic Colobomata of Eyelids.*—Dr. H. Knapp insists on the importance of the removal of any cicatricial tissue present. In a case recorded of gap in the lower eyelid, he obviated the tension produced when the edges were brought together, by incising the outer canthus, and then separating the adjacent skin below subcutaneously. He uses fine Chinese silk for sutures, is careful to put in enough, and bandages both eyes. He points out that it is the action of the orbicularis which separates the edges of the wound in the eyelid; and to obviate this separation, either vertical incisions should be made on either side the coloboma, through the skin and muscle, or division of the outer canthus, &c., should be practised. Careful union of the edges may suffice in some cases, and may be aided by supporting sutures, through whole thickness of lid, and a quarter of an inch from the edge of the wound and supporting strips of plaster. The latter, however, are scarcely applicable. Both eyes should be closed. The inner portion of the lower eyelid, in a severe case, may be loosened with scissors, subcutaneously, without injuring the canaliculus, sac, or tarsal cartilage, or dividing the inner commissure. Three woodcuts are given. (Archives of Ophthal. and Otol., Vol. v, No. 1, p. 18.)

*Anthrax of Lower Eyelid.*—Dr. H. Knapp records a case of carbuncle of the inner surface of the lower eyelid in a boy. He regards it as a rare disease. He practised and recommends free incisions. (Archives of Ophth. and Otol., Vol. v, No. 1, p. 28.)

*Cysticercus Cellulosæ of the Upper Eyelid.*—A case under the care of Dr. Wecker is noted in the Annales d'Oculistique, Mars–Avril, 1876, p. 146. The tumour was removed entire.

*An Epidemic of Conjunctival Blenorrhœa caused by Conjunctivitis Gonorrhoica*—Dr. Brunhuber remarks on the fact that the affection only spread to eyes already damaged by some inflammation. The cases were in different rooms of the same hospital, but near each other. Three patients became affected—the second

probably from contact, one day they were together for some time; and the third from the second by means of a sponge. Attention is called to the fact, that the infection occurred at a time when the discharge had almost ceased, and it might have been expected that danger had passed. (Zehend. Monatsbl., xiv, Jan.–Feb.)

*Transplantation of Conjunctiva from the Rabbit in Symblepharon.*—Dr. Joseph Imre records two unsuccessful attempts, and remarks thereon and refers to the literature of the subject. (Zehend. Monatsbl., xiv, July–August, pp. 256–267.)

*Primary Lupus of the Conjunctiva.*—Dr. Pflüger records a case treated by puncturing and use of nitrate of silver. (Zehend. Monatsbl., xiv, Mai.)

*Congenital Strabismus.*—Dr. Pflüger records two cases. When the patient looked straight forwards, there was divergence. On turning the head to one side the eyes became straight, and then, if the movement was continued further, the eye which had diverged, converged. Vision in each eye was good. In each case the right external and internal recti were affected. The alternation between convergent and divergent strabismus was remarkable. In one case the right eye was myopic $\frac{1}{30}$, the left, $\frac{1}{20}$; in the other the sight was normal, whilst the left was myopic $\frac{1}{18}$; that is, in each the squinting eye showed a lower refraction than the other. (Zehend. Monatsbl., xiv, Mai.)

*Operation for Strabismus.*—Dr. Driver says he has for years never operated on the shortened muscle, but has dealt with its antagonist. He does not simply stitch the muscle forward so that one portion overlaps the other, as Noyes does, but he divides the muscle, and cuts a piece away proportionate to the amount of the squint. He only uses two sutures, and takes care to pass one before dividing the muscle, thus avoiding the trouble of hunting for the end retracted within Tenon's capsule. The advantages claimed are, (1) that he always attains his object by one operation. He has now operated on 53 cases. (2) As the insertion of the muscle is not dissected away, but the muscle is divided beyond it, the risk of altering the direction of traction of the muscle is avoided. (3) Healing takes place more rapidly than after the ordinary plan of stitching, as the conjunctiva is not involved. The stitches can be removed in 48 or 72 hours. (4) The motions of the globe are not interfered with as is the case when the shortened muscle is retracted. (Zehend. Monatsbl., xiv, März–April, p. 133.)

*Buphthalmus Congenitus.*—Dr. Fritz Raab records the case of a girl aged 5 years, the subject of buphthalmus congenitus; and the results of his examination of an eye removed from a boy ten years of age. (Zehend. Monatsbl., xiv, Jan.–Feb.)

*The Influence of Opacities on the Cornea, in producing Strabismus.*—Dr. Hirschberg contributes a paper on this subject.

(Centralblatt f. Med. Wiss., Aug. 14, 1875.) During the stage of inflammation of the cornea, whilst a child keeps the eye constantly turned upwards and inwards, a squint may result from contraction of the internal rectus, but opacities on the cornea can only lead to strabismus when hypermetropia is present. They may favour internal strabismus by making any false image produced less obvious to the patient, but more usually by causing the light to fall on the retina to one side of the centre. If an eye affected with an opacity is accurately focussed for rays coming from an object, the image formed will be central; but if the retina be out of focus, then the interception of rays by an opacity will cause the circles of dispersion on the fundus to be placed excentrically. It can be shown experimentally that the form of the aperture through which light is admitted does not prevent the light falling in an axial direction through a lens on to a screen placed exactly in focus; but if the screen be out of focus, the circles of dispersion will be placed excentrically, unless the aperture admitting light be circular. The opacity in front of the pupil will practically prevent the aperture admitting light being circular; and therefore, if the eye be hypermetropic, the circles of dispersion formed on the retina will be to one side of the centre. As soon as the eye begins to squint, it will be found that the convergence helps the other eye to see, by allowing a greater effort of accommodation, and thus an internal strabismus is maintained. If the eye affected with opacity is hypermetropic, whilst the other is normal, or is more hypermetropic than the one without opacity, then it can never be in focus at the same time as the other. If we try to remedy a strabismus by glasses, we must test and correct each eye separately. Opacities on the cornea without inflammation, and without errors of refraction, cannot give rise to strabismus.

*Congenital, almost complete, Staphyloma of the Cornea.*—Dr. Treitel describes the specimen, and gives an illustration of a section through the eyeball (fig. 3, plate 2.) (Graefe's Archiv., Bd. ii, Abth. 2, p. 231.)

*Neuro-Paralytic Keratitis.*—Dr. Treitel records a case. There was a tumour of the left side of the base of the skull, involving the Casseiran ganglion, &c. There was a remarkable atrophy of the left optic nerve at one part near the optic foramen, probably caused by pressure. (Graefe's Archiv., Bd. xxii, Abth. ii, p. 239.)

*Case of Sclerosing Keratitis.*—Dr. Baumgarten had an opportunity of examining an eye microscopically, which had presented to the naked eye an appearance as if the sclerotic had encroached on the cornea. No evidence was obtained that this had really occurred. There was a plentiful cell-growth, and fatty degeneration. The case and appearances are described in detail. (Graefe's Archiv., Bd. xxii, Abth. ii, pp. 185–203.)

*Experiments on Keratitis from Inoculation.*—Dr. G. Stromeyer records the results of injecting septic material into the cornea, with the view of exciting a spreading ulcer and hypopyon. He summarises to the effect that, (1) by injecting decomposing organic fluids, or those capable of decomposing, into the cornea of the rabbit, we may excite a keratitis which, both in its tendency to further extension and its local symptoms, has the greatest similarity with the hypopyon-keratitis met with in the human subject. (2) We may excite a very similar inflammation by injecting masses of bacteria artificially procured, and free from foreign admixture. (3) This latter keratitis differs from that excited by the injection of septic or specific material (diphtheritic, pyæmic, &c.), owing to its tendency to spontaneous subsidence. (4) The injection of artificially procured bacteria masses into the chamber is followed by a severe adhesive iritis resembling that following injection of the cornea. (5) The fluid used for the development of the bacteria, when injected in a state of dilution, still competent for the nourishment of the bacteria, has no influence on the cornea, or anterior chamber. (6) By prolonged boiling, the bacteria may be killed, and rendered inert. (7) The spreading of the substance injected takes place by continuity of tissue, and not by the aid of the anterior chamber, or absorption from the conjunctival sac. (8) A part of the naked eye changes in the cornea is caused by collections of fungus elements. (9) Salicylic acid does not appear to exercise any influence as an antiseptic in such keratitis. (Graefe's Archiv., Bd. xxii, Abth. i, pp. 100–140).

*Investigations on Keratitis.*—S. Stricker insists on the importance of following out the steps of a process he details, in order to arrive at satisfactory results. He experiments on the corneæ of kittens. A dry stick of caustic potash is used to cauterise the cornea, and nitrate of silver subsequently to stain it. The cornea is excised a few minutes after staining, and placed in water slightly acidulated with acetic acid, and left for two days or more. Excellent lamellar preparations can then be obtained. The corneal corpuscles ramify in different directions, and by their processes form a network. When the inflammation begins, these processes swell, and the meshwork becomes coarser. As the process becomes more developed, the swelling becomes greater. The cornea at this part is now traversed by a thick meshwork. This condition may be regarded as the stage of inflammatory swelling and infiltration. The meshwork is composed entirely of cells and cell processes. Lines of demarcation are formed between individual sections of a cell or a process; that is, the cells and processes "divide." As the meshwork and its branches swell, the basis substance (matrix) which is visible in its meshes gradually diminishes. Finally, these islands of matrix become smaller and smaller, until they disappear. The mosaic-

like meshwork has become a mosaic-like nodule. This nodule has taken the place of the normal tissue, and when the adherent cells, which have already become divided, actually separate and fall apart, the tissue is disintegrated, and suppuration has occurred. The products of the cell division are either pus corpuscles or still smaller bodies, and the author has not decided whether they are still capable of development, or whether they are merely masses of detritus. The inflammatory swelling and the suppuration are limited by the line of demarcation which exists between the living cells and the dead. The author says the main thoughts running through his remarks are—

1. That the swelling of the branched corneal corpuscles determines the nature of the inflammatory swelling, as well as of the inflammatory infiltration. 2. That infiltration does not mean suppuration, but merely one of its preliminary steps, a step from which a return to the normal condition by diminution of the swelling is conceivable. The tissue is infiltrated with the still undivided substratum of purulent formation. The infiltration may disintegrate into pus, but in the beginning it is certainly not pus. In conclusion, certain changes in nerve-fibres in the inflamed part are pointed out. Their contents underwent segmentation just like the branched cells. Either the endothelium swells and becomes segmented, or the axis cylinders have become segmented, or else the two conditions exist together. Illustrations are appended. (Archives of Ophthalmology and Otology, Vol. v, No. 1, p. 1).

*Pterygium.*—Dr. F. Mannhardt has a paper on this subject in Graefe's Archives, Bd. xxii, Abth. i, pp. 81–102.

*A Method of Fixing a Thread to a Needle.*—Dr. G. Martin adopts the plan of threading the needle (armed in the ordinary way) and the short end through the long end near the needle in two places. The tighter the long end is then pulled, the firmer is the short end held. If desired, a second needle may be used. If so, the first needle is armed in the ordinary way, the second needle is threaded on the short end, and then the point of the second needle is passed through the long end near the first needle twice. By this means, the short end is threaded twice through the long end, and gripped by it, so that it cannot slip, and there is no projecting knot to obstruct the passage of the thread. (Annales d'Oculistique, Mars–Avril, 1876, p. 117).

*Iridotomy (or Iritomy).*—Dr. Wecker finds that it is well to operate much earlier than he formerly supposed after extraction of cataract, and subsequent closure of pupil and traction of the iris towards the wound. By operating during the inflammatory stage, he cuts short the mischief, and avoids that extreme stretching of the iris which often ensues. He has modified his scissors by making one blade sharp-pointed, so that it is not necessary to perforate the iris, &c., before entering them, and

thus bleeding is obviated. The blunt-pointed (upper) blade is one millimeter (half a line) longer than the other, and, when the blades are closed, acts as a guard to the sharp one. He makes an incision with his *couteau à arrêt* at the outer part of the cornea (within the sclero-corneal junction), if the cataract has been extended upwards, so that the incision lies vertically to the transverse diameter of the cornea. In withdrawing the knife, care should be exercised to allow the aqueous to escape very slowly. The scissors are introduced, and opened almost directly, the sharp blade being below. They are pushed straight on, the sharp blade perforating the iris, &c., and when they have reached a sufficient distance well across the iris, on the other side of the pupil, a quick snip is made, thus making a transverse cut in the iris, &c. The upper and lower portions of the iris then retract, leaving an oval pupil, with its long axis transverse. If the pupil be drawn very much towards the cataract wound, then the knife must be entered somewhat higher up. If, however, the pupil be near the centre, then the knife (as stated) must be entered opposite the transverse diameter of the cornea. If the result of the first operation does not give a good pupil, yet the inflammation is checked, and the eye is in a better state for a second iridotomy. Woodcuts are given. (Zehend. Monatsbl., xiv, Sept., p. 281, and Annales d'Oculistique, Mars-Avril and Juillet-Août, 1876, p. 36.)

*Primary Sarcoma of the Iris cured by Excision of the Tumour.*—Dr. C. J. Kipp records the case of a man, aged 36, who had noticed a reddish nodule at the lower margin of the iris in the right eye for about twelve years. The growth had been exceedingly slow till about a month previously. For a few weeks, the sight had failed. The anterior chamber was partly filled by a growth of a flesh colour attached to the inner and lower quadrant of the iris. A sketch is given. An incision having been made in the cornea of sufficient size, the tumour and adjacent portion of iris were drawn out with forceps, and the portion of iris snipped off. The patient did well, and the vision at the end of a fortnight was quite normal. The growth proved to be a white spindle-celled sarcoma. There was no history of injury. The author quotes three other cases recorded. In addition, we may call attention to one recorded in the Ophth. Hosp. Rep., Vol. v, p. 230. The patient was a man, aged 25. The tumour was of slow, painless growth, and unattended by inflammation. It contained pigment. At p. 189, a somewhat similar case is noted, but here the growth was not limited to the iris. (Archives of Ophth. and Otol., Vol. v, No. 1, p. 34).

*Death after Iridectomy.*—Dr. S. Klein places on record the case of a girl, aged 6, on whom he performed a double iridectomy for opacities in the corneæ. Chloroform was administered. The next day, she complained of slight pain in one eye. A few hours later, convulsions came on, she became insensible, and died. The

post mortem showed congestion of the brain and lungs. (Zehend. Monatsbl., xiv, Mai, p. 171).

*The Diseases which accompany Iritis, or are secondary to it.*—Dr. J. Schnabel writes a detailed article on this subject in the Archives for Ophthal. and Otol., Vol. v, No. 2, p. 153. He adduces evidences to show that iritic adhesions cannot be said to be a cause of recurrent iritis. He divides the cases of chronic iritis into those in which the iritis progresses steadily; those in which there are acute exacerbations (without intervening total cessation), and those in which there are intermissions and relapses of iritis. In many of the cases of acute iritis there are no adhesions, and where there are synechiæ, patients are not by any means more liable to repeated attacks than in cases where synechiæ are wholly absent; i · cases which last for years, the attacks do not become more frequent though the adhesions may become more numerous. He thinks the name "recurrent" is only applicable in a very few cases, and prefers the term chronic. He tabulates a number of cases in which he examined the fundus with the ophthalmoscope in early stages of iritis from whatever cause. He has found diffuse retinitis most frequently; changes in the vitreous comparatively seldom, and anomalies in the choroid most rarely. He lays particular stress on the early occurrence of retinitis and changes in the vitreous, and believes that choroiditis is a much less frequent complication than has been supposed, and that the vitreous changes are independent of choroidal mischief. The retinitis is often present when the iritis is but slight and lasts longer than the latter. When the vitreous is affected the retina is also, almost invariably. He argues at some length in favour of the occurrence of inflammation of the vitreous. He thinks we too readily assume its association with choroiditis. He narrates a case in which several attacks of inflammation of the vitreous occurred whilst the retina and choroid remained normal. In connection with this case he alludes to some very curious solid, opaque, greenish, filiform and convoluted fixed and floating films he has met with in the vitreous, and which he regarded as new formations. (One or two of the descriptions suggest persistent hyaloid.) In cases where the iritis subsided, but the vision began to decline, we must suspect that retinitis and hyalitis accompanying the iritis did not improve with it, but slowly aggravated and caused the amblyopia. He narrated cases showing this, and also that the deeper changes may precede the iritis and even cause synechiæ. Iridectomy has no influence on the course of the retinitis or hyalitis. If, however, circular synechia is followed by iritis and retention of the exudation in the posterior chamber, iridectomy is indispensable. Circular synechia does not of itself necessitate a relapse of iritis, but immensely increases the danger of a subsequent iritis, since it diminishes or almost abolishes the possibility of a spontaneous

recovery. The tension of the tissue of the iris by accumulated exudation causes a permanent inflammatory irritation, manifesting itself by severe and persistent pain and a disturbance of circulation, of which numerous dilated blood-vessels on the surface of the iris bear witness. If a globe has become atrophic, it will rarely fill again after iridectomy. The improvement in vision after iridectomy is due to the letting in of more light. He alludes to cases in which the vision has even become unaccountably diminished after iridectomy on account of the presence of adhesions or in glaucoma.

*Sympathetic Ophthalmia.*—Dr. S. C. Ayres narrates cases:—(1) M., æt. 4, wound of cornea, prolapse of iris and cataract resulting from injury from the beak of a bird. Sympathetic inflammation of the other eye in nine months. He could see light with the injured eye for four months. It became irritable when the other began to fail. Vision very imperfect in sympathetically affected eye. (2) M., æt. 46, vision in one eye lost directly after injury from piece of iron. Tender place left where injured. Prolapse of iris, traumatic cataract. Sympathetic inflammation in nine weeks. Second eye very defective. (3) F., æt. 6, corneal wound, prolapse of iris which was snipped off, cataract. Suppurative irido-choroiditis rapidly supervened. In five weeks, the other eye inflamed and the anterior chamber was half full of lymph and pus. Vision quite lost. (4) M., æt. 5, wound in sclero-corneal junction. Vision lost. Sympathetic inflammation in six weeks. Perception of shadows. (5) M., æt. 38, rupture of inner portion of sclerotic by blow on outer side. Lens dislocated inwards beneath conjunctina. Sympathetic inflammation of the other eye in six weeks. Loss of vision in this eye, and gradual recovery of fair vision in the injured eye with use of strong convex glass. The following points are noted: In three of the cases (1, 2, and 3) the wound was in the cornea and was complicated with prolapse of the iris and cataract. In one case (4) the wound was at the sclero-corneal junction, opening the anterior chamber and causing prolapse of the iris, but not wounding the lens, and in case 5 there was rupture of the sclerotic with dislocation of the lens under the conjunctiva. The periods at which the sympathetic inflammation developed were as follows: in Case 3, at five weeks; in cases 4 and 5, at six weeks; in Case 2, at nine weeks, and in Case 1. slight symptoms at four months, but none severe until nine months after injury. In Case 3, enucleation of the injured eye was made within a few days after development of sympathetic trouble, but it had no good effect. In 1, 2, and 4 enucleation was practised later, also without any good effect. One striking feature in the cases is the freedom from pain, except in one nervous man. (Archives of Ophthal. and Otol., Vol. v, No. 2, p. 221.)

*Sympathetic Ophthalmia— Recovery of the secondarily affected Eye, and improvement of the wounded one.*—Dr. J. Samelsohn contributes a paper founded on the case of a lad, aged 14, who received an injury to the left eye while playing with a hoop. There was a wound involving the ciliary region and attended by a small prolapse of iris. Treatment by atropine, leeches, absence of light, &c., was carefully carried out. Six days after the accident a small hypopyon appeared. About a month after the accident the eye became much worse, but improved again in about a week. The other eye then began to be affected with serous iritis. Enucleation of the left was recommended, but consent could not be obtained. Several iritic adhesions formed in the eye secondarily affected, but there was no marked effusion of lymph. Both improved, and at the end of ten weeks from the accident the patient returned to school. The right eye then seemed normal. In the left the prolapse of iris was completely cicatrised, but the spot was still painful on pressure The iris acted well under the influence of atropine, but there were a few synechiæ. On ophthalmoscopic examination one-third of the margin of the disc passed without any line of distinction quite horizontally in the form of an opaque streak outwards towards the macula lutea (exposed sclerotic from rupture of the choroid ?). The patient was seen again at the end of a year. His vision remained good in the right eye and half in the left. Diagrams of the field of vision and of the ophthalmoscopic appearances are given. In addition to the rupture of the choroid there was an opacity in the vitreous as was supposed or possibly a detachment of the vitreous (according to Iwanoff). At one time the vision in the wounded eye was so bad that it was supposed to be utterly lost.

In discussing the question by what form of disease of the injured eye, sympathetic ophthalmia may be produced, the author remarks we have in the above case an extremely complicated and extensive lesion ; rupture of the choroid and retina, organised opacities, and probably also detachment of the vitreous, and finally an injury of the ciliary body with prolapse of the iris. Experience has taught us that the latter is a frequent source of sympathetic inflammation, especially when affecting the sclero-corneal junction. The other injuries have usually no tendency to produce the sympathetic mischief. The progress of the case also indicates the ciliary injury as the starting point. The inflammation following the injury must be regarded as a cyclitis, though of the serous form, and not hyperplastic. Some of the symptoms belonging to cyclitis were absent, but, on the other hand, those which particularly engaged attention, the rapid appearance and disappearance of hypopyon with alternating contraction and dilatation of the pupil without any corresponding alterations in the tissue of the iris, justified the diagnosis of cyclitis. We have a case where an exudative form (of hypopyon-

cyclitis) and not a hyperplastic cyclitis with retraction of the ciliary processes and ciliary margin of the iris became the conductor of the sympathetic process, and the observation seems to widen the sphere of the latter. For, if the hyperplastic form depends on irritation of the ciliary nerves, in consequence of the contracting cicatricial tissue, that modification of the nervous irritation which manifests itself by sudden changes of the intra-ocular pressure is illustrated in the above case as shown by the history. At the beginning the pupil was contracted, the intra-ocular pressure increased and hypopyon present, whereas the decrease of the inflammation is manifested by dilatation of the pupil, diminution of the intra-ocular pressure and absorption of the hypopyon. This series of symptoms may be explained most easily by the aid of the nervous system. The trigeminus and the sympathetic have the power of influencing the pupil and intra-ocular pressure, and how manifold the circumstances and combinations caused hereby is best illustrated by observation of certain forms of keratitis, in which, at the height of the inflammation, we find a contracted pupil, the tension of the globe diminished and a total absence (in spite of atropine) of all tendencies toward resorption; while the decrease of the inflammation is marked by dilatation of the pupil, increased intra-ocular pressure, and high absorbing power. Though no explanation of these anomalies is given in our latest works, it may be judged from an examination of the above case that the conduction of the sympathetic symptoms, by means of the ciliary nerves, is essentially increased by a sudden diminution of the intra-ocular pressure. This was anticipated by Graefe. The form of inflammation present in the above case may explain the favourable termination. For, if the changes which a hyperplastic cyclitis induces in the injured ciliary body gradually increase and eventually become permanent, it is to be inferred that the sympathetic changes depending thereon, once declared, will assume a progressive character; while, on the other hand, in that form, depending on alternating secretionary anomalies, all the changeable and temporary symptoms setting up irritation will, in the same way, induce transitory sympathetic changes corresponding to the nature of the affection. The anatomical condition seems to warrant such a conclusion. In the one case there is a discoloured disorganised iris, with strong retraction of its ciliary insertion; in the other, a normal condition of the iris, a few adhesions and a distorted pupil due directly to the injury.

A differential diagnosis of these two forms may be of value in the prognosis of sympathetic inflammation and in deciding the question of prophylactic enucleation. As to the delicate question of the nature of the nervous influence in sympathetic affection, the above observation demonstrates one fact only, namely, that it is not an inflammatory process creeping along the course of the nerves

since an inflammatory process could neither so suddenly nor so rapidly transmit the changes of the primarily affected eye to its fellow. (Archives of Ophthal. and Otol., Vol. v, No. 1, p. 48.)

*Spinal Myosis.*—Dr. Hempel collects the cases hitherto published by Argyll Robertson and others, and narrates fresh ones. He points out that in affections of the cervical sympathetic, the pupil (as noted by Hutchinson) is of moderate size, and its condition depends on incomplete paralysis of the dilator pupillæ. Atropine causes complete dilatation. In the cases under consideration, the most striking symptom is often the extremely small size of the pupil. Here we have to deal with complete paralysis due to an affection of the *centre* for dilatation, and associated with secondary contraction of the sphincter. Atropine has only a moderate effect. That the myosis cannot be due to central irritation of the third nerve may be gathered from the fact that the ciliary muscle is not affected, as well as from the action of atropine. Paralysis of the ciliary muscle, with or without paralysis of the sphincter pupillæ, may be met with in these cases, but not spasm of accommodation. Dr. Argyll Robertson pointed out that in cases of myosis, though the pupils do not act to light, they will dilate when the accommodation is relaxed on looking in the distance, and contract when the accommodation is used in looking at near objects. This may be explained (Wernicke) by assuming that the communication between the optic nerve and the third nerve is interrupted, so that the reflex irritation of the third nerve cannot be produced by the influence of light. The centre of the third nerve is, however, intact, because reaction promptly follows in any effort of accommodation. The principal condition is probably an inability of the pupil to react to the influence of light, and the state of the pupil is probably an accidental complication. We may have (1) paralysis of the dilator (myosis); (2) paralysis of the sphincter (mydriasis); (3) paralysis of both muscles (medium size of the pupils); (4) both muscles may be competent (medium size of pupils). The first is most frequently met with in affections of the spinal cord; the second cannot be distinguished from that due to other causes, and the third may be overlooked or mistaken for simple mydriasis; the fourth occurred in Wernicke's cases. In all (three) one eye only was affected. The want of reaction to the influence of light may depend on (1) paralysis of the optic nerve, (*a*) in the course of its trunk, or (*b*) at its centre; (2) the communication between the centre of the optic nerve and that of the third may be interrupted; or (3) the third nerve may be paralysed. (Graefe's Archiv., Bd. xxii, Abth i, p. 1.)

*Filaria Medinensis in the Anterior Chamber.*—Dr. Barkan records a case. The patient was a man aged 30. He had long suffered from granular lids, &c., and his corneæ were opaque in great part, but the lower half of the left was clear, and a small thread-like

foreign body could be seen adherent to the lower part of the iris. The body was removed by iridectomy, and proved to be a filaria medinensis. (Archives of Ophthal. and Otol., Vol. v, No. 2, p. 151.)

*Dislocation of a Transparent Lens into the Anterior Chamber.*—Dr. G. Sous. The patient, a female aged 37, was slightly myopic, but had enjoyed good vision till she struck her eye against the back of a chair. She then noticed she could not see so well as before, but better when lying on her back than standing up. Three months later, after stooping, she noticed her sight was worse, and that it remained always much the same. She declined any operation. (Annales d'Oculistique, Mars-Avril, 1876, p. 120.)

*Spontaneous Dislocation of the Lens.*—Dr. J. Hirschberg gives an account of the examination of an eye removed for irritation in connexion with dislocation of the lens into the anterior chamber in a case of myopia. The patient was a woman, aged 69. She was not aware when the sight of the eye was lost, but it had only been inflamed fourteen days. The lens could be seen in the anterior chamber, its lower margin being in front of the lower part of the iris. The portion of optic nerve removed was curiously bent, and the inter-vaginal space on one side was found much dilated. Representations of sections are given. (Graefe's Archiv., Bd. xxii, Abth. i, p. 65.)

*The Uselessness of Bandages, &c., after Cataract Extractions.*—Dr. Gayet writes in favour of leaving the eye without any compressive bandage, as he believes it is better to allow the eye and eyelids free movement. (Annales d'Oculistique, Mai-Juin, 1876, p. 252.)

*Cataract Extractions.*—Dr. Driver records the results of 200 cataract extractions on Wecker's plan. In 91 per cent. he had V. from $\frac{20}{20}$ to $\frac{20}{100}$; in 4 per cent. $\frac{20}{100}$ to $\frac{20}{1000}$. In these, however, the operation was a success, but other causes led to the amblyopia. In 2 per cent. improvement was to be expected from iridectomy; in 3 per cent. the eyes were completely lost. In 99 of the cases iridectomy was performed; in 101 the pupil remained sound. Loss of vitreous occurred three times, twice in the first 50 cases and once only in the last 150. Most of the patients were sent out within a week; the average stay was $9\frac{1}{2}$ days. Chloroform was not given in any case, and in the last 109 cases no assistance was necessary during the operation. (Zehend. Monatsbl., xiv, März-April, p. 135.)

Cases under care of Dr. Wecker noted. (Annales d'Oculistique, Mars-Avril, 1876, p. 124.)

*The Extraction of Cataract amongst the Greeks and Romans.*—By Dr. Hugo Magnus. (Graefe's Archiv., Bd. xxii, Abth. ii, pp. 141–184.)

*Pyramidal Cataract.*—Dr. Goldzieher records the results of his examination of three cases. In two the cataracts were con-

genital, in the third acquired. In all, the capsule passed over the cataract. In the acquired one there was an adhesion between the lens and the iris. (Centralblatt f. Med. Wiss., Dec. 4, 1875, from Pest. Med. Chir. Presse.)

F. Poncet reports on a case of double congenital pyramidal cataract. The capsule passed over the pyramid. The result of his examination indicated an inflammatory process at an earlier period in the cornea, iris, and anterior capsule. He considers the pyramidal cataract to be a conical projection of the anterior capsule brought about by traction when the lens, adherent by past inflammation, is again pressed back by the aqueous. (Centralblatt f. Med. Wiss., Mar. 22, 1875, from Arch. de Phys.)

*On the Histology of the Lens.*—Dr. Ritter continues his investigations on the structure of the lens by giving an account of the structure of the centre of the lens in the calf. (Graefe's Archiv., Bd. ii, Abth. ii, p. 255.)

*The State of the Ciliary Processes during Accommodation.*—Prof. Hjort has investigated the position of the ciliary processes during accommodation in a case of absence of the iris and in Albinos. He used Calabar Bean, and magnified by means of a Brücke's lens. By this means he obtained a good view, and he gives figures showing what he saw. He found that the ciliary processes came forwards so as to be more visible, and seemed to enlarge. The edge of the lens became thicker. The space between the lens and the apices of the ciliary processes remained unaltered. The edge of the lens seemed to be further from the base of the processes (sclerotic margin). His observations tend to demonstrate the truth of the received views on accommodation. (Zehend. Monatsbl., xiv, Juli–August, pp. 205–222.)

*Myopia and Cataract.*—Prof. Hasner has investigated statistically the question of the more frequent occurrence of cataract in myopes. He found cataracts in 16 per cent. of myopes. Low degrees of myopia do not seem to be specially inducive of cataract. In myopia of moderate degree cataract seemed relatively frequent, and in higher degrees iritis, choroiditis and hyalitis were common and may easily lead to cataract. Cataract presenting the ordinary signs of the senile form did not appear specially frequent before the age of 50, but afterwards it seemed so. It does not appear (as has been stated) that cataract in myopes progresses particularly slowly. (Zehend. Monatsbl., xiv, Juli–August, p. 251.)

*The employment of a Lens, combined with a Stenopœic Apparatus, in certain cases of Anomaly of Refraction, with diminution of the Acuity of Vision.*—Dr. Badal has found that in some cases of irregular astigmatism, excessive myopia, or opacities on the cornea, vision is improved by a pin-hole aperture and a lens, when either alone is scarcely of any use. The aperture shuts off too much light, and a lens magnifies, but diffuses the images. The two combined will sometimes give remarkable results. The lens magnifies and collects

the light, whilst the pin-hole aperture gives sharpness to the image. (Annales d'Oculistique, Mai–Juin, 1876, p. 248.)

*Optometer*, on the metrical system, for the simultaneous measurement of the refraction and of the acuity of vision, even in illiterate persons. Dr. Badal (Annales d'Oculistique, Mars–Avril, 1876, p. 101.)

*Spectacles consisting of Reflecting Prisms for use in insufficiency of the Internal Recti, &c.*—Dr. Bœttcher describes and figures some glasses he contrived for a patient who could not converge long without being tired; the prisms are rhomboid in shape, and the two together correspond to the distance between the pupils. Each is 14 mm. (half an inch) thick from before backwards, and 16 mm. from above downwards: they are so placed that the rays from a near object falling on the long anterior surface of each prism, are reflected by the hypothenuse (which makes an angle of 45° with it) through the length of the prism, and then by the other hypothenuse to the eye; by this means the object is seen under an angle one-fourth of what it would otherwise be. The prisms meet over the nose, and this must be protected from pressure. The four reflecting hypothenuse surfaces must be covered with black taffeta, but the latter should not be in contact with the glass. The upper and lower surfaces of the prisms must be blackened and also those portions in front not required for the transmission of rays.—(Graefe's Archiv., Bd. xxii, Abth. i., p. 73.)

*Dilatation of the so-called Canal of Petit and Secondary Detachment of the anterior part of the Vitreous.*—Dr. Hermann Pagenstecher narrates cases in which vision was lost generally with increase of tension, and in which on examination of the eyes after removal he has found changes leading him to conclude that dilatation of the canal of Petit had occurred from effusion from the ciliary processes, &c. Several illustrations of sections through the eyeballs are given (Plate V). He finds also that fluid injected into the anterior chamber makes its way into the canal of Petit and pushes the vitreous backwards. Iridectomy if made well back must open this canal and allow of the escape of any fluid effusion. The size of the iridectomy does not matter so much as that it should be peripheral. (Graefe's Archiv., Bd. xxii, Abth. ii, p. 271.)

*Anatomical Examination of a Coloboma of the Iris and Choroid.*—Prof. W. Manz gives a detailed account of an examination which he made of two eyeballs showing coloboma. One of the chief features of interest was the fact that he found the retina and choroid adherent at the coloboma, as if it were in some measure a scar, and that remains of retinal tissue were still present. Representations of a section through the eyeball and another through the coloboma are given. (Zehend. Monatsbl., xiv, Jan.–Feb.)

*Large Orbital Sarcoma removed without removing the Eyeball—Death from Acute Nephritis.*—Dr. H. Knapp records the case.

(Archives of Ophthal. and Otol., Vol v, No. 2, p. 131.) The patient was a man, aged 38, who came under care for a high degree of exophthalmos of the right side. He had suffered for years from inveterate syphilis. The apex of the left lung was dull on percussion; his digestion was poor, and he suffered from diarrhœa. The exophthalmos had been noticed about two years; the eye was quite blind, the media were clear, and the disc could be seen to be in a state of neuritis descendens. A tumour could be felt at the inner and lower part of the orbit; it seemed separate from the globe, but not from the orbital wall. The tumour was rapidly growing, and its removal was necessary. As the eyeball seemed separate from the growth, it was thought the latter might be removed without enucleating the globe. The tumour was found to implicate the optic nerve and to pass far back to the apex of the orbit. The nerve was divided and all the tumour removed (with some difficulty), except a portion passing into the inferior orbital fissure. A portion of the floor of the orbit was removed and then the maxillary sinus opened; the eyeball was pushed back and the upper eyelid which had been divided vertically stitched. The globe seemed of normal tension, and sensation was lost over its inner half. The daily progress is given and the ophthalmoscopic signs noted. Ulceration of the *outer* part of the cornea occurred. There was free suppuration, and the patient sank on the twelfth day after suffering from diarrhœa, vomiting, delirium, coma, &c. The postmortem showed a tough greyish infiltration of the apex of the left lung, of the size of a fist; acute nephritis of both kidneys, gummata in the liver and one testis. The antrum was full of pus, and the growth had extended into the inferior orbital fissure. On examination the tumour proved to be a periosteal sarcoma. Under the microscope the cellular elements were greatly in excess of the fibrous, and consisted of round, oval, spindle or giant cells. Parts of the recti muscles were infiltrated, and the optic nerve and adjacent parts of the retina. Sketches showing a section of muscle and of the entrance of the optic nerve are given. Dr. Knapp makes some interesting remarks on the case. We allude to a few points. The growth filled the greater part of the orbit, involved and disorganised the inner rectus muscle, surrounded the optic nerve, invaded the outer sheath at one place only, and there penetrated into the nerve itself. This place was the point of contact between the periosteum and the sheath of the nerve at the optic foramen. The growth spread along the nerve in the direction of the globe only. The sarcomatous elements were present in the bundles of the nerve-fibres and absent in the interstitial connective tissue. It has been already mentioned that the intra-ocular end of the nerve and the adjacent retina were infiltrated with sarcoma cells. It is common enough for growths to spread from the eyeball along the optic nerve to the orbit, but this case shows the reverse. Dr. Knapp, thinks orbital

tumours do not cause neuritis by mere pressure or obstruction to the circulation, but only by encroaching on the sheath of the nerve and causing inflammation of the nerve itself. In a previous case of extirpation of a portion of the optic nerve (see *Periscope*, Vol. viii, p. 613), no blood-vessels were visible in the fundus for three or four days, but in the present case the vessels never disappeared entirely, and the fundus was reddish white; the reddish colour increased day by day. This was also noticed in a case in which Dr. Gruening removed a myxoma of the optic nerve with preservaton of the eyeball. This depends on anastomosis of the branches of the ciliary arteries with choroidal vessels. It is noted that the patient whom he operated on previously remained well at the end of two years; Dr. Gruening's patient also did well. In conclusion, it is pointed out that it was remarkable the ulceration of the cornea should occur on the outer side and not on the inner side which was anæsthetic.

*Cysticereus in the Orbit.*—Dr. Waldhauer records a case and refers to others. (Zehend. Monatsbl., xiv, Mai, p. 152.)

*Voluntary Suppression of a Divergent Squint coincident with vigorous exercise of accommodation.*—The patient, though when his eyes were passive he had a considerable divergent strabismus and could see well, yet had the power of bringing the eyes parallel, but with a simultaneous exercise of accommodation, requiring a —6 glass to enable him to see in the distance. The same anomaly existed as regards near vision. The external rectus of the squinting eye was divided with partial improvement, then that of the other, and finally the first was divided a second time; the eyes were now straight, and the sight of the squinting eye was improving by exercise. He had not lost the power of extreme convergence however, as he could now voluntarily produce a convergent strabismus. Dr. W. Block. (Zehend. Monatsbl., xiv, Mai.)

*Calabar Bean in Glaucoma.*—Dr. Laqueur has employed Physostigmine (Dequesnel's Neutral Sulphate of Esérine) in some cases of glaucoma with advantage. He uses a watery solution ($\frac{1}{3}$ to $\frac{1}{2}$ p. c.), three or four drops being instilled (at intervals of twenty minutes) daily. The remedy may be continued for three or four weeks without any ill effect. At the end of three to four days great improvement resulted in five cases of glaucoma simplex, and one case of secondary glaucoma. Whether the result is permanent may be open to question, but the diminution of tension lasts long after the pupil has resumed its normal size. On the normal eye it does not seem to have any effect in diminishing the tension. Its effect on glaucomatous eyes may possibly be due to its directly stimulating the smooth muscular fibres of the choroidal vessels. The author thinks the remedy is indicated (1) in all cases of simple glaucoma; especially those in which the iris and anterior chamber are normal, for in these cases iridectomy is of no avail generally. (2) In cases in which an iridectomy has

failed. (3) In those cases of secondary glaucoma in which the iris is not adherent. In one case of hæmorrahgic glaucoma the remedy was without avail. (Centrabl. f. Med. Wiss., June 10, 1876, p. 421.)

Dr. Lucius remarks that Dr. A. Weber in 1871 used calabar bean to diminish tension in a case of staphyloma. The effect was marked. A solution was dropped in daily every hour till the tension was diminished. The staphyloma disappeared. It was then used in cases of deep ulceration of the cornea where perforation was dreaded, with great success. In 1873 it was used in glaucoma, and again in 1874. In the latter case the cure has been permanent. If the iris is affected it is not advisable to use calabar in ulcers of the cornea. In glaucoma absolutum, when operation was refused, the pain was relieved. In a case of staphyloma under treatment the tension diminishes towards evening under use of the calabar, and increases again in the morning. The staphyloma is diminishing. (Centrabl. f. Med. Wiss., Aug. 12, 1876, p. 581.)

*Sparkling synchysis.*—Dr. F. Poncet examined the eyes of a man, aged 42, who came under care three months after he first noticed occasional clouds before the eyes. Sparkling synchysis was detected in both eyes, and slight atrophy of the choroid in one. His vision was almost normal at times. He died of pyæmia after an operation on the scrotum, and the eyes were then obtained. He found crystals of cholestearine and of tyrosine and cellular elements, partly free and partly encrusted with phosphates. There were also separate globular collections of phosphates. Figures of these are given, and the literature of the subject discussed. The changes found pointed to fatty degeneration of the vitreous. The cellular elements were pigmented, and the author considered the pigment could only have come from the choroid. When migrated into the vitreous they might act as foreign bodies, and set up inflammation in the new elements (or old) in the vitreous. (Annales d'Oculistique, Mai–Juin, 1876, p. 255.)

*Cysticercus in the Vitreous.*—A case is recorded by Dr. Wecker (Annales d'Oculistique, Mars–Avril, 1876, p. 147). The patient was a man aged 22. He had noticed his left eye failing about six months, and he attributed the failure to overwork. His V.=$\frac{1}{50}$. A very definite opacity could be seen in the posterior part of the vitreous, and there was a yellowish reflection from the neighbourhood of the macula lutea. Between this highly reflecting surface and the disc was a detachment of the retina. Below and inwards was a bluish, transparent vesicle, recognised as a cysticercus. It did not change its position much. An attempt was made to perforate the cysticercus through the sclerotic with a Graefe's knife, but was not successful. The sclerotic was then laid bare at the outer side, an incision made

through it, and the cyst extracted after some trouble, but with exceedingly little escape of vitreous. Before the operation the symptoms of irritation of the vitreous were increasing rapidly. The result was surprising. Very little irritation followed. The eye was kept covered for a fortnight. He could count fingers with difficulty. Externally the eye had a normal appearance.

*Vascular protrusion of both Eyeballs, most probably from arterio-venous communication in the Cavernous Sinus—Total Blindness—Ligation of the left common Carotid—Recovery.*—Dr. Emil Gruening records the case of a married woman, æt. 59. Ten weeks previously she had received an injury to the head in a fall downstairs. On the fourth or fifth day after the accident the patient noticed a faint noise in the head, which gradually increased. She found that the left eye squinted inwards and protruded. A day later the other began to bulge. On ophthalmoscopic examination each disc presented the appearances known as "choked disc," and in the left there were hæmorrhages. A loud bruit could be heard. It was stopped by pressure on the left carotid, and checked by pressure on the right carotid. The pressure on the left could not be borne for long without causing dizziness, faintness, or even complete syncope. Pressure was tried at intervals for a week. She was then lost sight of for a fortnight, when she was again seen, with all her symptoms aggravated and entirely blind. Several days later the left carotid was tied. Very soon afterwards the patient exclaimed that she could again see. The bruit quite disappeared, and did not return. The eyes gradually regained motive power, the hæmorrhages disappeared, and the vision of the right eye became good, whilst that of the left improved. The author refers to the statistics collected by Dr. Morton (Am. Jour. Med. Sci., April, 1865, and July, 1870), and Dr. Henry Noyes (New York Medical Journal, March, 1869). (In the *Periscope*, Vol. viii, pp. 112–119, and p. 380, we have given abstracts of various cases, and we may also refer to a paper on Pulsating Tumour of the Orbit, by Mr. Walter Rivington, in the Med. Chir. Trans., Vol. lviii, 1875. Notes of about seventy-five cases are given, forty-one being of traumatic origin.)

*The Minute Structure of the Choroid.*—Dr. Hubert Sattler contributes a paper (Graefe's Archiv., Bd. xxii, Abth. ii, p. 1–100) on the anatomy of the choroid. He describes the different layers and their modifications in the ciliary region. Most internally is the vitreous lamella, or basement membrane. Under a low power it appears homogeneous, but under higher powers a lattice work becomes visible on its outer aspect; then follows the capillary layer; next to this a continuous endoepithelial layer, with oval pale nuclei, like those in the supra-choroidea; then follows a network of delicate elastic fibres arranged in several layers with the small arteries and smaller and medium sized veins; next comes another endoepithelial layer, and upon this is a coarser

elastic network with numerous pigmented cells; outside this are the branches of the larger vessels; and finally, the numerous lamellæ of the supra-choroidea. The structure is traced in the fœtus as well as in the adult, and in the lower animals. He also discusses the histology of inflammation of the choroid.

*The cause of the Cherry-red Spot at the Macula observed in many affections*—Dr. Hugo Magnus maintains that the cherry-red spot so often seen at the macula in cases of hæmorrhage into the optic nerve and in embolism is clearly not due to any disease at the macula, but to the fact that the macula remains transparent whilst the surrounding parts are opaque. If the nerve layer is rendered less transparent, and this often occurs, the yellow spot must remain unaffected, as the fibres are absent there. The opacity will conceal the choroid anywhere except at the macula. He details a case of detachment of the retina which he watched for some time, and in which the parts surrounding the macula became affected, whilst the macula itself remained intact, and showed the bright cherry-red spot. (Zehend. Monatsbl., xiv, Mai, p. 145–152.)

*Atrophy of the Choroid and its relation to Enlargement of the Eye-ball.*—Dr. Wilhelm Goldzieher is of opinion that atrophy of the choroid and of its vessels in certain parts may lead to congestion at other parts by collateral circulation, and thus to hydrops bulbi, and enlargement. (Centralblatt f. Med. Wiss., Dec. 4, 1875.)

*Detachment of the Retina caused by a medicinal dose of Whisky.*—Dr. H. Knapp records the case of a man, aged 64, who came under his care with a detachment of the lower half of the retina in the right eye. The man had always been myopic, but had had good vision till six weeks previously. At that time he was troubled with diarrhœa, and to check it he took a glass of strong whisky. Immediately afterwards he noticed the sight of the right eye became very dim. He was a temperate man, and said he never took strong spirits except to relieve some temporary ailment. Dr. Knapp remarks: though in the prophylactic treatment of progressive near-sightedness or advanced posterior staphyloma we never fail to caution our patients against the abuse of stimulants, the above case is a striking example that in this affection even a single large dose of alcoholic liquor may lead to disastrous consequences. (Archives of Ophthal. and Otol., Vol. v, No. 1, p. 32).

*Treatment of Detachment of the Retina.* — Dr. Samelsohn advocates the application of a compressive bandage over the affected eye whilst the patient maintains the recumbent position; the other eye is protected from the light. The bandage should be removed and applied twice daily, and continued for three or four weeks. It is necessary to employ both rest in the horizontal position and compression. His experience of the treatment extends over twelve cases. (Centralblatt f. Med. Wiss., Nov. 13, 1875.)

*Retinal Changes in Progressive Pernicious Anæmia.*—Professor W. Manz contributes a short note to the Centralblatt f. Med. Wiss., Sept. 11, 1875, on changes met with in the retina in progressive pernicious anæmia. In a case he examined during life, he was struck with the colour of the "extravasations" which he saw. They were not of the bright red tint often seen in the retina, but of a dirty reddish brown. The larger spots were near the disc and yellow spot, the smaller more peripheral. The vessels seemed partially empty, they had broad light streaks, the finest arteries seemed, for the most part, white streaks bordered with thin red lines; the larger veins, however, were of a remarkably deep red colour, and somewhat dilated. After death, examination showed most of the blood spots to be round, white in the centre, and possessed of a capsule. The contents consisted of small round cells containing nuclei or some finely granular protoplasm. Around the central portion lay colourless blood corpuscles, though mostly at a definite distance from the central body, and leaving a sort of clear space (ring) between them. The relation of the spots to the blood vessels was most interesting. The capillaries showed dilatations here and there; in places these were lateral (sacculated), in others fusiform. They were either empty or contained formed elements: white or red blood cells, or a finely granular substance, hiding the cells. The larger blood-spots with thicker capsule had doubtless a similar origin; but their connexion with the vessels could not be traced. They might either be actual dilatations or diverticula of the vessels, or of their peri-vascular spaces. The extravasations in the retina in pernicious anæmia resemble therefore the so-called capillary apoplexies of the brain. There may be no extravasations of blood, merely aneurismal dilatation of capillaries. The retina should therefore be carefully examined after death in every case of pernicious anæmia, even though the ophthalmoscopic examination should have not revealed extravasations.

*Microscopic Examination in a Case of Albuminuric Neuro-Retinitis.*—Dr. Treitel gives the history of a patient who died with albuminuric retinitis, &c., and whose eyes were examined ophthalmoscopically and with the microscope. There were few hæmorrhages, but many white patches, and some highly refracting spots resembling cholestearine. On microscopic examination, no evidence of cholestearine was obtained. A curious stalked body was observed in connection with one optic disc. Numerous corpora amylacea were found amongst atrophied nerve tissue, and their histology is detailed. The author supports Leber's views as to the presence of a capsule, and the origin of the bodies from nerve fibres. (Graefe's Archives, Bd. xxii, Abth. ii, pp. 204–222.)

*Peculiar Conformation of the Optic Disc in an Atrophied Globe.*—Dr. Treitel records the examination of an atrophied globe removed for injury. The patient was a boy, aged 11. The eye had been

injured with a knife two years previously, and the globe was removed for sympathetic iritis of the other eye. The optic disc was found to project one and a half millimetres (about $\frac{1}{16}''$) beyond the choroid. A figure is given showing a section through the disc; fig. 2, plate 2. (Graefe's Archives, Bd. ii, Abth. ii, p. 223.)

*Tumour of the Optic Nerve.*—Dr. M. Reich records the following:—A lad, aged 12, came under care with dilatation of the right pupil, a greyish yellow reflex being afforded by the deeper structures. It was supposed that the retina was elevated by a growth, and the eyeball was excised. On section a tumour was found in the optic nerve close to the eyeball, the retina was detached, &c. The growth was between the nerve substance and the sclerotic sheath. It showed numerous almost homogeneous, hyaline, tolerably thick, moderately refracting cylindrical bands or strings, some of which were cut parallel to their axes, some obliquely, and a few transversely. These lay amongst connective tissue, which completely filled up the intervaginal space. In a section across the nerve, these bands seemed roundish structures, or nodes of varying size surrounding the optic nerve on all sides. There seemed no trace of nerve fibres in the nerve. The bands, when more highly magnified, consisted of cells and finely granular masses lying amongst the bundles of fibres of the sclerotic. The cells were of an epithelioid type. Probably after existing some time, and partly under the influence of pressure and deficient nutrition, they were converted into the granular masses. In places the cells contained protoplasm, and the origin of the strings, &c., from the endothelial cells of the bands and fibres of the sclerotic and intervaginal space could be demonstrated. The tumour may be referred therefore to the group of pseudo-epitheliomata or endotheliomata. (Graefe's Archiv., Bd. xxii, Abth. i, p. 103.)

*Ophthalmoscopic Conditions in Basilar Meningitis of Infants.*—Dr. J. Hock contributes a paper on this subject to the Archives of Ophthalmology and Otology, Vol. v, No. 1, p. 60. No post mortem was obtained in either of his cases. The diagnosis was made by Dr. Monti. The changes in the nerves did not in any way resemble the "choked disc." There was no swelling, and therefore no "neuritis" properly speaking. He describes three conditions. *A*. The entrance of the optic nerve (inverted image) appears yellowish red, dull, lardaceous, the result, apparently, from examination in the upright image, of a delicate, crape-like opacity of the optic nerve fibres, leaving the central pit clear. The outlines of the disc are distinct, though not so sharply defined as in the normal condition; the level of the disc is not raised. The calibre and the course of the retinal arteries are perfectly normal; the retinal veins are dilated, darker, and more tortuous than usual, but remain in one plane, being uniformly visible in all

their parts. The part of the retina surrounding the optic disc appears somewhat opaque (much as the inner or upper margin of the optic disc sometimes appears in normal eyes). At a short distance from the disc, the fundus is perfectly clear and normal. *B.* By weak illumination, the fundus yields a dull, yellowish red reflex, as though a diffuse opacity of the refracting media were present; by strong illumination, this reflex varies from greyish yellow to grey. Corresponding to this condition, the optic disc and the retina, as far as the extreme periphery, are covered with an opacity through which the outlines of the disc can be distinctly recognised, but not the delicate details of the fundus. The optic disc is redder, but not raised; its vessels appear as in A. The veins of the retina, especially near the periphery, appear dark red, almost black. The lustrous waving retinal reflex is very marked, and accompanies the vessels to their smallest visible ramifications. The retina itself is grey, or blackish grey, in such a way that often nothing but the deep dark vessels and the accompanying retinal reflex are seen. *C.* (from a case of advanced meningitis in the stage of sopor). Colour and level of disc as in *A*. The retina around it is raised like a circular ridge, on which the blood-vessels ascend in curves. This ridge casts a shadow upon the area of the disc on that side which is turned from the light. The circular ridge is slightly opaque, totally different from the intensely opaque and red swelling in neuro-retinitis, and admits of recognising every part of the blood-vessels that pass over it. The opacity of the retina extends a short distance towards the periphery.

The author says that in placing these three conditions in the succession of A, B, C, he did not entertain the idea that the last-described condition was only a farther developed stage of the same affection, since he had repeated opportunities of observing the condition A in children during the last stage of meningitis; but he believes that these conditions, in the order in which they are placed, represent diseases of less or greater importance, for the morbid process in A is limited to a small portion of the background of the eye, and has changed the affected parts but little, whereas the conditions in B and C show more extensive and more important alterations.

*Right-sided Binocular Hemiopia — Right Hemiplegia — Choked Disc on Left Side—Tumour of Left Posterior Lobe and Softening of Optic Thalamus, &c.—History of Syphilis.*—The case is recorded by Dr. T. R. Pooley, with a view to prove semi-decussation of optic nerve-fibres. (Archives of Ophthal. and Otol., Vol. v, No. 2, p. 148.)

*Semi-decussation of the Optic Nerves in the Chiasma.*—Hirschberg (Virchow's Archives, Bd. lxv, p. 116) narrates a case which he considers favours the view of the semi-decussation of the optic nerves in the chiasma. A man, aged 60, had left-

sided frontal headache for four years. Then he had hemiopia for a fortnight, at the end of which time he died. The hemiopia affected the right half of each field, was complete, symmetrical, sharply limited close to the yellow spot, the line of demarcation being vertical. A tumour was found in the left frontal lobe. The left optic tract was much thinner than the right. The tumour was a glio-sarcoma. (Zehend. Klin. Monat., xiv, Jan.–Feb., p. 54.)

*Hemiopia and Optic Decussation.*—Dr. Hirschberg records a case of right-sided hemiopia and gives a diagram of the field of vision. He is in favour of semi-decussation. The ophthalmoscopic conditions corresponded accurately with Mauthner's supposition. The right optic disc, which receives the fasciculus cruciatus of the paralysed left tract, was partially atrophied. The atrophy always first makes its appearance on the side next the yellow spot. (Archives of Opthal. and Otol., Vol. v, No. 2, p. 188.)

Dr. Plenk also records a case of right-sided hemiopia, discusses the various forms of hemiopia which are met with, and gives diagrams of fields of vision. He points out fallacies which have to be guarded against before we really conclude that a patient has lost the temporal half of each field from an intracranial cause. He analyses the cases hitherto on record, and then passes on to nasal hemiopia. There seems reason to attribute the latter to local (ocular) disease, and not to any cerebral affection, or at any rate only indirectly. In right or left sided hemiopia the limit of the field in each eye generally forms a vertical line close to the point of fixation, but very various exceptions occur. He refers to Cohn's cases (see *Periscope*, Vol. viii, p. 374) and others. The variations may depend on the completeness of the paralysis of the optic tract. Dr. Plenk mentions a post mortem he saw in the case of a man who had lost his left eye twenty years previously. Both tracts were smaller than the right optic nerve, and the left nerve and right tract were particularly atrophied. A case of hemiopia with defect in the upper half of the field is narrated, and then the author sums up as follows: 1. Temporal hemiopia may be explained on the theory of semi-decussation quite as much as on that of total crossing. 2. The interpretation of right and left sided hemiopia offers many difficulties. The impairment of vision *per se*, but more particularly the accompanying appearances of paralysis, render the theory of total decussation highly improbable. "The latter conditions are more in favour of semi-decussation, for the exciting causes may be localised from the tract to the corpora quadrigemina and optic thalami, as has in reality been done from successful preparations obtained." 3. Those cases which have been described as *nasal* hemiopia, induced by pressure upon the posterior angle of the chiasma or by pressure of pathologically

changed arteries upon the outer borders of the chiasma, must be taken in the sense that the defects in the fields were caused by equilateral neuro-retinitis, independently of the central disease. The distribution of the nerve-fibres in the chiasma is not here brought at all into consideration. (Archives of Ophthal. and Otol., Vol. v, No. 2, pp. 191–220.)

Dr. Woinow makes a note on the eyes and brain of a woman who had lost the sight of her left eye in infancy. The right optic nerve was normal, the left atrophied; the left optic tract was markedly, the right moderately, atrophied. (Zehend. Klin. Monat., 1875, p. 424.)

*Daltonism and Young's Theory of the Perception of Colours.*—Dr. F. Rählman has a paper on this subject. His plan of testing the perception of colours has been described in the Archiv., Bd. xx, Abth. i, p. 250. He regulates the intensity of the different colours of the spectrum by means of a combination of Nicol's prisms. In the same paper he compared the sensitiveness of the periphery with that of the centre. He found that at a distance of 60° the periphery is nearly as sensitive to yellow as is the centre, six times less sensitive to green, three times less sensitive to blue, and four times less sensitive to red than the centre. In Bd. xxi, Abth. ii, he has investigated the perception to colours in affections of the optic nerve. He found that in such cases the perception of green was much diminished, more so than that of red and yellow; thus resembling the periphery of the normal eye. In the present paper he records several cases of colour blindness in persons who had good vision otherwise, and estimates their delicacy of perception of the different colours of the spectrum. He then discusses the bearing of Young's theory on these cases, and sums up to the effect that (1) in a large group, including cases of atrophy of the optic nerve, and certain cases of Daltonism without defect of sight, there is a change in the excitability of these nerve elements which normally permit of the recognition of green and violet. The curves which represent the degree of sensitiveness have their maxima displaced to the left towards the red. In this group the violet end of the spectrum is shortened. The older authors spoke of these cases as representing a want of perception of green. In another group (2), spoken of as blindness for red, the excitability of the nerve elements leading to the perception of red and green is altered in such a way that the fibres are adapted for more refrangible rays, so that the maxima of the curves for red and, in advanced cases, for green, are displaced towards the violet. Such cases are common, and he has formerly recorded such, but not in his present paper. In these cases the red end of the spectrum is shortened. (3) In another group, the rarest, the maxima of the curves of intensity correspond; both ends of the spectrum are shortened. (4) In the two first groups qualitative perception of light must depend on the admixture of

two fundamental colours, yellow and blue. The nerve fibres are only excited by rays of two degrees of refrangibility. In the third, qualitative perception is quite rudimentary, consisting only in a quantitative differentiation of shades of light. The nerve fibres are only excited by rays of one degree of refrangibility. (5) In the cases quoted the sensitiveness for certain colours is diminished, whilst that for others is normal or but slightly diminished. In some cases the sensitiveness for particular colours may be increased, whilst for others it may be diminished. Such cases do not differ essentially from those above mentioned; the ends of the spectrum are usually not shortened, however, but may on the contrary be lengthened. (Graefe's Archiv., Bd. xxii, Abth. i, p. 29.)

*Perception of Colours.*—Dr. Ricco has experimented by means of concentrating with an achromatic lens a beam of light in a darkened chamber on a portion of a rotating blackened disc, furnished with radiating slits one millimeter in width. At a convenient distance from the disc a white surface is placed, and in this may be seen a glimmering clear circle, and if we look steadfastly at this we shall see in the middle a lozenge-shaped variegated chequered patch, on which the least refractive colours, red, orange, and yellow predominate. At the circumference there is a small line made up of the more highly refrangible colours, blue, indigo, and violet. Entoptic shadows can also be perceived when a visiting card is rapidly rotated before the eye. He discusses the shadows thrown by the yellow spot and the lens, and the different sensibility of the eye for different colours of the spectrum. He throws a horizontal spectrum on a wall, and then looks at the image of it in a mirror made to oscillate in front of the wall. When the movement is slow the reflection of the spectrum is straight from end to end; but when the oscillation is more rapid the image seems bent at the yellow part of the spectrum, and both ends of the spectrum are bent backwards away from the wall, the violet is therefore considerably displaced. The image also widens steadily from the red to the violet. The image of the spectrum may be thrown on the wall, and may thus be seen by a number of observers at the same time. Other experiments are detailed. (Graefe's Archives, Bd. xxii, Abth. i, p. 282.)

*The State of the Vision in the Deaf and Dumb.*—Dr. Hans Adler (Zehend. Monatsbl., xiv, März–April.)